



**Oregon** **TECH**

General Catalog  
**2013-2014**

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Oregon Institute of Technology

## **Oregon Institute of Technology**

General Catalog  
© 2013-2014

[www.oit.edu](http://www.oit.edu)  
(541) 885-1000  
3201 Campus Drive, Klamath Falls, OR 97601-8801

*Hands-on education for real-world achievement.*



# Welcome to Oregon Tech

## Table of Contents

### User's Guide

To assist you in navigating the 2013-14 General Catalog, we have organized its contents into nine major areas. The index at the end of this catalog can help in locating specific information. The general catalog is printed annually and available on the web at [www.oit.edu](http://www.oit.edu).

<b>I</b>	<b>Welcome to Oregon Tech</b>	4
	General Information; Non-Discrimination Policy; Students with Disabilities; Alternate Format; Accreditation; Mission and Objectives; Welcome to Oregon Tech; Academic Calendar; Oregon Institute of Technology; Essential Learning Outcomes; Degree Programs; History at a Glance	
<b>II</b>	<b>Admissions and Financial Aid</b>	11
	Office of Admissions; Application and Admission Procedures; Financial Aid Programs; Application Process and Priority Deadlines; Residency; Western Undergraduate Exchange; Reciprocity Agreements; Tuition and Fees	
<b>III</b>	<b>Academic Programs</b>	21
	Klamath Falls; Portland; Oregon Tech–Seattle, Washington; Oregon Tech at Chemeketa Community College; La Grande–ODS College of Dental Sciences; Distance Education; Youth Programs	
<b>IV</b>	<b>Academic Policies and Procedures</b>	26
	Procedures and Regulations; Advanced Standing; Catalog of Graduation; Grading System; Graduation; General Education Requirements	
<b>V</b>	<b>University Departments and Programs</b>	37
<b>VI</b>	<b>Graduate Programs</b>	132
	Graduate Admissions and Academic Policies	
<b>VII</b>	<b>Course Descriptions</b>	136
	Summary descriptions of courses offered by Oregon Tech	
<b>VIII</b>	<b>University Services</b>	219
<b>IX</b>	<b>Directories</b>	232
	Listing of Governance and Advisory Boards; Administrative Offices; Administration; Faculty; Faculty Senate Presidents; Emeritus Faculty and Administration; Index	

# General Information

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. It is open weekdays from 8 a.m. to 5 p.m. to serve prospective students, applicants and their families, as well as high school guidance counselors, college-transfer advisors and teachers.

If you are interested in seeing the Klamath Falls campus, the Admissions Office's visit coordinator can arrange for you to meet with a faculty member and an admissions counselor, tour the residence halls and the rest of the campus, sit in on a class and/or talk with one of our coaches. To set up a campus visit, call (800) 422-2017 or (541) 885-1150. Hearing-impaired persons may call the TTY number: (541) 885-1072. You also can request a campus visit at [www.oit.edu](http://www.oit.edu) or by e-mailing [oit@oit.edu](mailto:oit@oit.edu). If you wish to visit one of Oregon Tech's other campuses, the Admissions Office can provide you with a contact person who can make arrangements for you.

## Non-Discrimination Policy

Oregon Tech does not discriminate on the basis of race, color, ethnicity, national origin, gender, disability, age, religion, marital status, sexual orientation or gender identity in its programs and activities. The following person is designated to handle inquiries and complaints regarding this non-discrimination policy: Affirmative Action Officer, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801; (541) 885-1108; FAX (541) 851-5200; e-mail: [ron.mccutcheon@oit.edu](mailto:ron.mccutcheon@oit.edu).

## Students with Disabilities

Oregon Tech is committed to accommodating the academic and programmatic needs of qualified students with disabilities. Students with disabilities who anticipate needing accommodations should contact Services

for Students with Disabilities, LRC 222, as soon as possible in advance of enrollment, to ensure timely provision of services. Questions may be directed to: Services for Students with Disabilities, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801. (541) 885-1129.

## Alternate Format

This publication is available in an alternate format for persons with disabilities. Please contact Services for Students with Disabilities at (541) 885-1129.

## Accreditation

Oregon Tech is accredited by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. Accreditation, licensure or approval of individual programs are listed in departmental sections. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

## General Catalog Production

The 2013-14 General Catalog was produced by the Registrar's Office and the Marketing and Communication Department at Oregon Tech. Wendy Ivie, University Registrar; Ashley Van Essen, Public Relations Representative; typesetting and cover design by Bill Goloski, Publications and Graphic Design Manager. Information in this catalog was accurate at the time of publication, but is subject to change without notice and does not constitute a contract between Oregon Tech and the student or applicant. The general catalog is printed annually and available on the web at [www.oit.edu](http://www.oit.edu).

# President's Welcome

Welcome to Oregon Tech! You have chosen a university that will challenge you, excite you, and provide you with many opportunities to excel. Oregon Tech graduates are known for their ability to excel immediately in the private sector as well as in graduate and professional schools. This means that, on average, Oregon Tech graduates earn some of the highest starting salaries in the nation and are among the top 15% in mid-career salaries as well.

The small class size and hands-on approach to education at Oregon Tech is perfectly tailored to a learning environment that encourages communication, collaboration, and competency. Oregon Tech is focused on students, student satisfaction, and student success. We are proud of our students' accomplishments and their post-graduation successes as alumni.

Our tagline, "Hands-on education for real-world achievement," is more than a slogan – it truly is the way we do busi-

ness. Faculty members bring their real-world problem-solving experiences into the classroom, and Oregon Tech students have myriad opportunities to gain hands-on experience outside the classroom through externships, internships, cooperative programs, and capstone projects.

By attending Oregon Tech, you have chosen an education and a future that we know will be filled with learning, success, satisfaction, and a lifelong connection to the university and to each other. By attending Oregon Tech, you have chosen rigor, quality, and relevance. By attending Oregon Tech, you are part of the excellence, innovation, and success that have served Oregon Tech's graduates well and have continuously increased our reputation and rankings in Oregon, the Pacific Northwest, and nationally. Welcome to the Oregon Tech Family – we're glad you're here and we very much look forward to helping you achieve your own personal success while you are here as students and after you graduate as alumni!



**Dr. Christopher G. Maples**  
*Oregon Tech President*

## Mission Statement and Core Themes

### Mission Statement

Oregon Institute of Technology (Oregon Tech), a member of the Oregon University System, offers innovative and rigorous applied degree programs in the areas of engineering, engineering technologies, health technologies, management, and the arts and sciences. To foster student and graduate success, the university provides an intimate, hands-on learning environment, focusing on application of theory to practice. Oregon Tech offers statewide educational opportunities for the emerging needs of Oregon's citizens and provides information and technical expertise to state, national, and international constituents.

### Core Themes

Oregon Institute of Technology:

- Applied Degree Programs
- Student and Graduate Success
- Statewide Educational Opportunities
- Public Service

*This statement of mission and the core values for Oregon Tech was approved by the State Board of Higher Education on January 7, 2011.*

# Academic Calendar 2013-14

## Fall Term, 2013

MAY 13-23	Registration for Fall Term
SEP 26-27	Registration for those not registered in advance (new freshmen, new transfer students, and new non-admitted students and re-enrolling students)
SEP 27-28	New student orientation
SEP 30	Classes begin
SEP 30-OCT 11	Fee payment
OCT 4	Last day to use Web for Student for all registration changes
OCT 4	Last day to drop courses with 100% refund
OCT 11	Last day to pay fees or register without late charge
OCT 11	Last day to drop without a "W"*
NOV 4-15	Registration for Winter Term
NOV 15	Last day for course withdraw*
NOV 11	Veterans Day holiday
NOV 27 –DEC 1	Thanksgiving holiday
DEC 6	Last day to completely withdraw from the University
DEC 9-12	Final exams week
DEC 13	Fall Term ends
DEC 14	Clinical Lab Science Commencement

## Winter Term, 2014

NOV 4-15, 2013	Registration for Winter Term
JAN 1	New Year's holiday
JAN 6	Registration and orientation for new students
JAN 6	Classes begin
JAN 6-17	Fee payment
JAN 10	Last day to use Web for Student for all registration changes
JAN 10	Last day to drop courses with 100% refund
JAN 17	Last day to pay fees or register without late charge
JAN 17	Last day to drop without a "W"*
JAN 20	Martin Luther King, Jr. holiday
FEB 17-27	Registration for Spring Term
FEB 21	Last day for course withdraw*
MAR 7	Salem – Dental Hygiene Commencement
MAR 9	La Grande – Dental Hygiene Commencement
MAR 14	Last day to completely withdraw from the University
MAR 17-20	Final exams week
MAR 21	Winter Term ends

**Spring Term, 2014**

FEB 17-27	Registration for Spring Term
MAR 31	Registration and orientation for new students
MAR 31	Classes begin
MAR 31–APR 11	Fee payment
APR 4	Last day to use Web for Student for all registration changes
APR 4	Last day to drop courses with 100% refund
APR 11	Last day to pay fees or register without late charge
APR 11	Last day to drop without a “W”*
MAY 5	Registration for Summer Term for all students begins
MAY 12-22	Registration for Fall Term
MAY 16	Last day for course withdraw*
MAY 26	Memorial Day holiday
JUN 6	Last day to completely withdraw from the University
JUN 9-12	Final exams week
JUN 13	Spring Term ends
JUN 14	Klamath Falls Commencement
JUN 15	Wilsonville Commencement

**Summer Term, 2014 (8-week session)**

MAY 5	Registration for all students begins
JUN 23	Classes begin
AUG 15	Summer Term ends
First 4-week Session	
JUN 23	Classes begin
JUL 18	First 4-week Session ends
Second 4-week Session	
JUL 21	Classes begin
AUG 15	Second 4-week Session ends

\* Instructor and advisor permission required after the fifth day of classes.

Additional calendars can be viewed at: [www.oit.edu](http://www.oit.edu).



# About Oregon Tech

Oregon Institute of Technology (Oregon Tech) is one of seven public, state-supported universities belonging to the Oregon University System and is accredited by the Northwest Commission on Colleges and Universities. Individual programs also are accredited by the appropriate professional organizations.

Oregon Tech is Oregon's only polytechnic university. With a mission to deliver technology education throughout the Pacific Northwest, we partner with business and industry leaders to ensure our programs adapt to new technologies and workforce demands. Oregon Tech's real-world focus gives our students a competitive edge: 90 percent are employed or in graduate school within six months of graduation. Year after year, our baccalaureate graduates garner the highest starting salaries in Oregon and among the highest in the nation.

Our applied approach to teaching, which blends theory and practice, is the main reason our graduates and alumni are so avidly recruited. Oregon Tech students have amazing opportunities to apply what they learn in lab-based classes, clinics, externships and workplaces. Oregon Tech's faculty and staff, who come to Oregon Tech with relevant business, industrial, or clinical experience, reinforce this practical focus in the classroom. And in every program, a relevant general-education core underscores major studies, broadening students' understanding of the world and teaching them to communicate effectively, solve problems, and think for themselves.

Students at Oregon Tech find a robust university atmosphere personalized by individual

interactions with professors and staff. Oregon Tech fosters a personalized educational experience through an intimate campus environment distinguished by small classes and a student-to-faculty ratio of 20:1. This student-focused approach to teaching and learning provides many benefits of a private education at a public price.

## One Oregon Tech, Two Primary Campuses, Program-Specific Branch Campuses, and E-Learning, too!

Oregon Tech is one institution with multiple locations. Established in 1947, Oregon Tech offers degree programs at locations throughout the State of Oregon and even beyond to meet the needs of students seeking a top quality, hands-on education.

The main, residential campus is located in **Klamath Falls** in beautiful Southern Oregon. Our campus in Klamath Falls is nestled on the eastern slope of the Cascade Mountains. The 190-acre campus offers spectacular views of Upper Klamath Lake, pine-studded knolls and snow-capped peaks from nearly every building. Klamath Falls, a city of about 20,000 residents (45,000 in the urban growth area), is located in Klamath County in south-central Oregon, about 20 miles from the California border and in the same county that has Crater Lake National Park. Known as Oregon's "City of Sunshine," Klamath Falls enjoys about 300 days of blue skies each year.

Our new campus in **Wilsonville**, located just south of the greater Portland metro area, offers degree programs in a state-of-the-art

facility. Oregon Tech has enjoyed a presence in the Portland area for more than 30 years. The university occupied four different locations throughout Portland over the years, but as of Fall 2012, the campuses consolidated and all programs moved to the beautiful, new Wilsonville campus. Oregon Tech also kept a focused presence on the West side of Portland, in collaboration with Portland Community College and Portland State University. The Wilsonville campus offers an array of programs and is easily accessible to green businesses for externships and employment located in Oregon's high-tech corridor (aka, Silicon Forest).

Since 2005, Oregon Tech has partnered with Oregon Dental Service and Eastern Oregon University to provide Oregonians the opportunity to obtain an Associate of Applied Science degree in Dental Hygiene in **La Grande**. The university also offers a baccalaureate program in dental hygiene in **Salem** through a partnership between Oregon Tech and Chemeketa Community College. The classrooms and dental hygiene clinic are located in Chemeketa's new, state-of-the-art Health & Sciences Building. The program requires one year of prerequisite (pre-dental hygiene) coursework prior to acceptance.

Oregon Tech offers online programs through the **Distance Education** department. Oregon Tech understands that working professionals are busy and ready to advance their education as quickly and conveniently as possible. The university offers a growing number of degree-completion programs and full-degree programs through online delivery.

# Essential Learning Outcomes for Students

Oregon Tech students will demonstrate these institutional student learning outcomes:

- Effective oral, written and visual communication
- The ability to work effectively in teams and/or groups
- An understanding of professionalism and ethical practice
- Critical thinking and problem solving
- Lifelong and independent learning skills
- Mathematical knowledge and skills
- Scientific knowledge and skills in scientific reasoning
- Cultural awareness

## Degree Programs

### Master of Science

Civil Engineering  
 Manufacturing Engineering Technology  
 Renewable Energy Engineering

### Bachelor of Applied Science

Technology and Management

### Bachelor of Science

Applied Mathematics  
 Applied Psychology  
 Biology  
 Biology-Health Sciences  
 Civil Engineering  
 Clinical Laboratory Science  
 (joint degree with OHSU)  
 Communication Studies  
 Computer Engineering Technology  
 Dental Hygiene  
 Diagnostic Medical Sonography  
 Echocardiography  
 Electrical Engineering  
 Electronics Engineering Technology  
 Embedded Systems Engineering  
 Technology  
 Environmental Sciences  
 Geomatics, with options in:  
 Geographic Information Systems  
 Surveying  
 Health Care Management, with  
 options in:  
 Administration  
 Clinical Management  
 Radiologic Science Management

Information Technology, with options in:

Accounting  
 Applications Development  
 Business/Systems Analysis  
 Health Informatics

Management, with options in: Accounting

Entrepreneurship/Small Business  
 Management  
 Marketing

Manufacturing Engineering Technology

Mechanical Engineering

Mechanical Engineering Technology

Nuclear Medicine Technology

Nursing (through OHSU, School of  
 Nursing)

Operations Management

Radiologic Science

Renewable Energy Engineering

Respiratory Care

Software Engineering Technology

Vascular Technology

### Associate Degrees

#### *Associate of Applied Science*

Dental Hygiene  
 Emergency Medical Technology–  
 Paramedic (joint degree with OHSU)  
 Polysomnographic Technology

#### *Associate of Engineering*

Computer Engineering Technology  
 Software Engineering Technology

# History at a Glance

- 1947 – July 14, Under the direction of Winston Purvine, the first classes were held in a deactivated World War II Marine Corps hospital three miles northeast of Klamath Falls.
- 1951 – KTEC radio went on the air.
- 1953 – Associate degree programs in the Surveying and Structural Engineering Technologies were first accredited by the Engineers' Council for Professional Development.
- 1956 – KOTI television opened on campus.
- 1957 – The institute was made a separate division of the State Board of Education and an engineering study was begun to determine whether to repair or rebuild the facilities.
- 1960 – The institute was transferred to the jurisdiction of the State Board of Higher Education.
- 1962 – The institute was accredited by the Northwest Association of Secondary and Higher Schools.
- 1964 – The campus moved to newly constructed buildings on a geothermal site overlooking Upper Klamath Lake.
- 1966 – The institute received authorization to grant bachelor's degrees.
- 1970 – Bachelor's degree programs first accredited by ABET.
- 1975 – Geo-Heat Center established.
- 1976 – Kenneth Light appointed President upon Purvine's retirement.
- 1983 – Larry Blake appointed President and the Metro Center was established in Portland.
- 1984 – Small Business Development Center established.
- 1988 – Portland Metro Center moved to its first permanent facilities on Southeast Harmony Road near Clackamas Town Center.
- 1989 – State Board authorized Oregon Tech to grant master degrees.
- 1991 – Lawrence J. Wolf appointed President.
- 1995 – Master's degree first offered.
- 1998 – Martha Anne Dow appointed President.
- 2001 – Oregon Renewable Energy Center established.
- 2005 – Oregon Center for Health Professions established.
- 2008 – Christopher G. Maples appointed President.
- 2012 - Wilsonville Campus opens.

# Admissions and Financial Aid

## Office of Admissions

College Union, 1st Floor  
800-422-2017 (toll free)  
(541) 885-1150  
(541) 885-1024 (fax)  
oit@oit.edu

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. Open weekdays from 8 a.m. to 5 p.m., its primary functions are to help prospective students investigate and evaluate Oregon Tech, to manage applications for admission and to assist applicants

with the enrollment process. The Admissions Office operates with the cooperation and support of the entire campus community.

Admissions welcomes visiting students and their families to daily tours, and sessions with admissions counselors, coaches, and other staff. Oregon Tech also hosts several Campus Preview events annually. For Campus Preview dates or to register online for a visit or Campus Preview, go to [www.oit.edu/visit](http://www.oit.edu/visit) or call (800) 422-2017. To visit Oregon Tech Wilsonville, call (503) 821-1250. Hearing

impaired persons may call the TTY number at (541) 885-1072.

Admission requirements apply to all applicants of Oregon Tech. All students who wish to enroll in more than eight credits in a term, receive financial aid and/or graduate from Oregon Tech must apply and be accepted for admission. Applications for general admission (excluding programs requiring specialized admission) are processed on the main campus in Klamath Falls regardless of the campus location for the student.

## Application Deadlines

The priority application deadline for maximum scholarship and financial aid consideration each fall term is March 1. Oregon Tech accepts applications on a rolling basis, but

students must have a complete application on file in Admissions three weeks prior to the first day of classes as follows:

2013-2014	Application Deadlines
Fall Term	September 9, 2013
Winter Term	December 16, 2013
Spring Term	March 10, 2014
Summer Term	June 2, 2014

## Applications

Applications for admission are available online at [www.oit.edu/apply](http://www.oit.edu/apply). Distance Education online degree programs at Oregon Tech require a specialized application available at [www.oit.edu/distance-education](http://www.oit.edu/distance-education). A complete application consists of an application for admission, application fee, official transcripts, test scores, and other required documentation depending on the type of applicant (see Admission Eligibility Requirements).

Students who were previously admitted, but never enrolled, and students who want to re-enroll after skipping four or more terms, must submit a Re-Enrolling & Update Application Form. Students who have not yet registered for classes may change their entry term, a major or a campus location by completing the Application Change Form online. Students who wish to enroll as non-degree

seeking students in no more than eight credits per term may submit a Non-Admit Application form; however students must be fully admitted to qualify for financial aid. These forms are available online at [www.oit.edu/applications](http://www.oit.edu/applications).

International students must complete the International Student Application. Students seeking enrollment through an approved exchange program must complete the International Exchange Application. Both are available online at [www.oit.edu/international](http://www.oit.edu/international).

The MS-Manufacturing Technology, MS-Renewable Energy Engineering, and the following majors require a secondary application process after students are granted general admission and after students meet the eligibility requirements of the program. Each

program has its own deadlines, admission requirements and processes which are outlined in the departmental pages of this catalog.

Clinical Laboratory Science (OHSU/Wilsonville)  
Diagnostic Medical Sonography  
Dental Hygiene (Salem, La Grande, Klamath Falls and online)  
Echocardiography  
Nuclear Medicine Technology  
Nursing (with OHSU/Klamath Falls)  
Paramedic/EMT (OHSU/Wilsonville)  
Radiologic Science  
Renewable Energy Engineering  
Respiratory Care  
Vascular Technology

## Application Procedures

Every applicant must complete the following steps:

1. Complete the appropriate *Application for Admission* ([www.oit.edu/applications](http://www.oit.edu/applications)).
2. Submit the \$50 non-refundable application fee. Checks or money orders should be made payable to Oregon Tech. Students who qualify may opt to defer the application fee until enrollment in classes. *OUS Application Fee Deferral Forms* are available at [www.oit.edu/applications](http://www.oit.edu/applications).

3. Applicants who have earned fewer than 36 college credits must have official SAT I or ACT scores sent to Oregon Tech. Some applicants who graduated from high school three or more years ago may be exempted from this requirement by permission of the Admissions Director.
4. Have official transcripts from all postsecondary institutions that you attended, or received credit from, sent directly to the Oregon Tech Admissions Office. Any offer of admission is contingent upon the submission of satisfactory final transcripts prior to enrollment at Oregon Tech.
5. Have official high school transcripts or GED test results sent directly to the Oregon Tech Admissions Office. High School records are not required from applicants who graduated prior to 1997 and who have earned at least 36 college credits. Applicants who are currently enrolled in high school may be admitted on the basis of six or more semesters of high school work provided that they will have met the 15 subject requirements at the time of high school graduation. In any case, each student's final official high school transcript must be provided upon graduation to complete the admission process.
6. Have official Advanced Placement (AP) or International Baccalaureate (IB) score reports sent to the Oregon Tech Admissions Office, if applicable.

Some programs at Oregon Tech do not have sufficient space to enroll all qualified applicants who seek admission. In these cases, Oregon Tech reserves the right to offer admission to the most qualified applicants, on a first-come, first-served basis or through a combination of the two strategies.

Upon admission and prior to registration, a completed health form showing evidence of adequate immunizations must be on file with Oregon Tech's Student Health Center. For further information, see the Student Health Center section of this catalog. Students are not required to submit these forms if taking fewer than six credits per term.

If a student fails to submit the required documents in complete and satisfactory order, admission and registration may be cancelled. All records become the property of Oregon Tech.

### Social Security Number Disclosure and Consent Statement

Students are requested to provide, **voluntarily**, a Social Security Number (SSN) to assist Oregon Tech and the Oregon University System (and organizations conducting studies for or on behalf of OUS) in developing, validating or administering predictive tests and assessments; administering student aid programs; improving instruction; internal identification of students; student parking; collection of student debts; or comparing student educational experiences with subsequent workforce experiences. When conducting studies, OUS will disclose a student's Social Security Number only in a manner that does not permit personal identification by individuals other than representatives of OUS (or the organization conducting the study for OUS) and only if the information is destroyed when no longer needed for the purposes for which the study was conducted. By providing your Social Security Number, students consent to the uses identified above. This request is made pursuant to ORS

351.070 and 351.085. Provision of a Social Security Number and consent to its use is not required and, if a student chooses so, will not be denied any right, benefit or privilege provided by Applicants may enter a series of zeros (000-00-0000) on their admission application in place of their actual SSN, but should be aware that by not providing their SSN they will not be eligible to receive federal student aid or university scholarships.

Additionally, applicants should be aware that Oregon Tech is required to obtain a Social Security Number in order to file certain returns with the Internal Revenue Service (IRS) for the applicant to receive a 1098T and to furnish a statement to you. The returns that Oregon Tech must file contain information about qualified tuition and related expenses. Privacy Act Notice: Section 6109 of the Internal Revenue Code requires students to give a correct SSN to persons who must file information returns with the IRS to report certain information. The IRS uses the SSN for identification purposes and to help verify the accuracy of tax returns. For more information, refer to IRS code 6050S.

## Admission Requirements

### Freshman Admission

Academic performance is not the sole criterion for admission. Oregon Tech may evaluate a person's behavior and background to determine their ability to maintain the standards of academic and professional

conduct expected at the university. An evaluation may take into consideration current behavior and performance as well as past experiences and actions. Simply qualifying for admission does not guarantee admission.

For freshman admission, students must meet entrance requirements adopted by the State Board of Higher Education in Oregon. Applicants who are enrolled in or who have graduated from regionally accredited high schools must:

1. Submit an official high school transcript. An unweighted cumulative high school grade point average of 3.00 is required for admission. Applicants with a GPA between 2.50 and 2.99 may qualify for admission provided they submit adequate SAT Reasoning Exam scores or ACT scores.
2. Submit results from either the SAT Reasoning Exam, SAT I or ACT
  - a. Applicants with an unweighted cumulative high school grade point average of 3.00 or better must take the SAT or ACT and have official scores submitted to Oregon Tech, but there is no minimum SAT or ACT score.

- b. Applicants with an unweighted GPA of 2.75 to 2.99 must submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.
  - c. Applicants with an unweighted GPA of 2.50 to 2.74 must submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.
  - d. Applicants who have graduated from a standard high school three or more years prior to the term they wish to be admitted and enter the university are not required to submit SAT or ACT aptitude test scores. However, if an applicant wishes to be considered for university scholarships, they must submit aptitude test scores.
3. Applicants must satisfactorily (grade of C- or above) complete at least 15 units (one year is equal to one unit) of college preparatory work in the following areas, unless they graduated from high school prior to spring 1985.
- a. English (4 units). Shall include the study of the English language, literature, speaking and listening, and writing, with emphasis on and frequent practice in writing expository prose during all four years.
  - b. Mathematics (3 units). Shall include first-year algebra and two additional years of college preparatory mathematics selected from geometry (deductive or descriptive); advanced topics in algebra (through Algebra II), trigonometry, analytical geometry, finite mathematics, advanced applications, calculus, and probability and statistics, or courses that integrate topics from two or more of these areas. One unit is strongly recommended in the senior year. (Algebra and geometry taken prior to 9th grade will be accepted.)
  - c. Science (3 units). Shall include at least one year each in two fields of inquiry based college preparatory science such as biology, chemistry, physics, or earth and physical science. Science courses that are “inquiry based” provide students the opportunity to apply scientific reasoning and critical thinking to support conclusions or explanations with evidence from their investigations. It is strongly recommended that one year be taken as a laboratory science.
  - d. Social Studies (3 units). Shall include analysis of societal issues and events. It is strongly recommended that study includes knowledge and use of geographic information, patterns of United States history, patterns of human history, structures and systems of US Government, and analysis of economic systems.
  - e. Second Language (2 units). Shall include two years of the same high school-level second language, or a C- or better in the third year of a high school-level language, or two terms of a college-level second language with a grade of C- or better, or satisfactory performance on an approved assessment of second language proficiency. Demonstrated proficiency in an American Indian language can meet all or part of the second language requirement, as certified by the governing body of any federally recognized tribe. American Sign Language meets the second language requirement. The second language requirement only applies to applicants graduating from high school in 1997 or later. If admitted as an exception, students failing to meet this requirement must complete two terms of the same college-level second language with a C- or better before earning a degree from Oregon Tech.

Applicants who are unable to meet the 15 subject requirements may be eligible for admission by earning a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (in Math level I or IIC and another test of the student's choice). Students who do not take a SAT Subject test

in a second language must prove language proficiency through another approved process.

Applicants who have not graduated from high school and who are applying on the basis of GED scores must submit test results

showing a minimum composite score of 580 (58 on GED exams administered prior to 2002) with a minimum score of 410 on each GED subtest (41 on subtests administered prior to 2002). GED applicants must meet the Foreign Language requirement.

Applicants whose GED scores fall below these standards may qualify on the basis of a combination of GED and SAT Reasoning or ACT exam results:

1. Applicants with GED composite scores of 550 to 570 (55 to 57 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.
2. Applicants with GED composite scores of 500 to 540 (50 to 54 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.

Public high school students must graduate from a standard or regionally accredited high school. Private high school students must graduate from regionally accredited high schools. Home-schooled students and graduates of unaccredited or non-standard high schools, as well as applicants who fail to meet the 15 subject requirements, may be admit-

ted by submitting SAT Reasoning Exam score of 1000 on the Math and Critical Reasoning sections combined or an ACT composite score of 21 or better and a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (Math level I or IIC and another test of the student's choice, in a subject other than math). An

examination in a second language is strongly recommended to qualify the applicant for admission by meeting the language proficiency requirements. Students who do not take an SAT Subject test in a second language must prove language proficiency through another approved process.

## Transfer Admission

A transfer student is one who has previously earned credits at another regionally accredited institution of higher education. A student must have earned at least 36 college-level credit hours (24 semester credits) to be admitted on the basis of his/her college record alone.

- Transfer applicants must have a cumulative 2.25 GPA or better in college level classes unless they hold an Oregon Transfer Module (OTM) or an associate or bachelor's degree, in which case, a cumulative GPA of 2.0 is required.
- In order to be admitted to Oregon Tech, transfer applicants must demonstrate proficiency in English and Math by completing the equivalent of Math 95 (Intermediate Algebra) or higher and WRI 115 (Introduction to Writing) or higher with grades of "C-" or better.
- Transfer applicants must have completed two terms of a college-level second language with a grade of C- or better, or two years of the same high school-level second language with grades of C- or better, or satisfactory performance on an approved second language assessment of proficiency. Demonstrated proficiency in an American Indian language can meet all or part of the second language requirement, as certified by the governing body of any federally recognized tribe. American Sign Language meets the second language requirement. The second language requirement applies to transfer applicants graduating from high school in 1997 or after.
- Applicants who do not have an Associate's or a Bachelor's degree must have at least 36 college-level credits. If more than 10 percent of an applicant's credits are in Physical Education, credits beyond the 10 percent threshold will not be counted toward meeting GPA requirements.
- Applicants must be eligible to re-enroll in the previous institution attended.

Official transcripts from all postsecondary institutions must be submitted for consideration. Applicants who graduated from high school after 1997 must also submit official high school transcripts, unless they have completed two terms of college-level study in a second language.

Applicants who have earned fewer than 36 quarter or fewer than 24 semester hours of college-level work must also provide high school transcripts or GED scores. They must also provide and SAT I or ACT scores. In some cases, these applicants must submit SAT/ACT scores. Admission will be based on both high school and transfer GPA and subject requirements. Students who have completed fewer than 12 transferable quarter credits (8 semester) must meet freshman admission requirements.

A *Transfer Evaluation Report* acknowledging the courses accepted by the university will be sent after admission status has been confirmed. Acceptance of vocational/technical courses may be granted after registration if the student's administering department finds that vocational/technical courses have satisfied certain bachelor's degree requirements. In all cases, course and/or department prerequisites will be enforced.

## Transfer Articulation Agreements

Oregon Tech is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major while minimizing overlap or repeat of courses. Some agreements accept an associate's degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at [www.oit.edu/articulations](http://www.oit.edu/articulations); students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the students' academic department or the Office of Academic Agreements.

## Non-Admit Students

A *non-admit* is a student who wishes to enroll

in no more than eight credits per term at Oregon Tech, is not seeking a degree from Oregon Tech and has never been fully admitted to Oregon Tech in the past. A non-admit is not eligible for financial aid. College-level classes taken while in non-admit status may be used toward Oregon Tech graduation requirements upon completion of the full admission process or may be transferred to other institutions. Enrollment as a non-admit student does not guarantee future admission to Oregon Tech. To enroll at Oregon Tech as a non-admit, submit the *Non-Admit Application Form* ([www.oit.edu/applications](http://www.oit.edu/applications)) to the Admissions Office, at least one week prior to enrollment. Oregon Tech reserves the right to deny enrollment to those who seek non-admit status.

## Admission to Programs Having Clinical or Practicum Requirements

It is important that prospective students understand that admission to those programs that have clinical or practicum requirements:

1. Is selective;
2. Will be granted after consideration of an applicant's ability to assume professional responsibility for clients, patients or students served by the program; and may be denied to any student with a record of past criminal behavior or psychiatric illness, which bears upon the student's ability to fulfill clinical or practicum responsibilities.

Students seeking admission to online degree completion programs in Radiologic Science, Vascular Technology, Echocardiography, Diagnostic Medical Sonography, or Respiratory Care, must meet all regular admission requirements and be registered professionals working in their chosen field. This will ensure access to clinical sites as required in these programs. For more information, contact the Distance Education Office.

## International Student Admission

Oregon Tech welcomes international students as applicants and as vital members of its campus community. In applying for admission, send the following to the Admissions Office:

1. An *International Student Application for Admission* accompanied by a \$50 (U.S.) non-refundable fee.

2. Official transcripts, in English or with an accompanying official translation, of all high school and post-high school institutions attended.
3. Official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 190 computer-based TOEFL, 68 Internet-based TOEFL or 6 IELTS is required for consideration.
4. A completed *Statement of Financial Responsibility* form, indicating that you have the necessary financial resources in U.S. dollars to support yourself while enrolled.
5. A letter, if appropriate, from parents and/or sponsors indicating the amount of financial support they will provide in U.S. dollars.
6. Documentation showing that you, your parents and/or your sponsors have adequate financial resources to meet your expenses while enrolled at Oregon Tech. Examples include official bank statements, tax forms and letters of employment showing annual earnings.
7. An official credential evaluation from an Oregon Tech-approved credential service for all coursework completed at a postsecondary institution outside the United States. Examples include the Association of Collegiate Registrars and Admissions Officers (<http://www.aacrao.org/international/foreignEdCred.cfm>) and World Education Services ([www.wes.org](http://www.wes.org)).

A completed health history and immunization form must be submitted. In addition to the health requirements that need to be fulfilled

before registration (refer to Integrated Student Health Center section of this catalog for health history and immunization requirements), international students must have at least one documented MMR vaccine on file at the Integrated Student Health Center prior to the student attending any classes (per OAR 333-050-0130). Also, students from countries identified as high risk for tuberculosis (most countries in Latin America and the Caribbean, Africa, Asia, Eastern Europe and Russia) are required to complete a TB screening upon entrance to Oregon Tech. This may include a TB skin test and/ or a chest x-ray. This can be done at the Integrated Student Health Center if records are not available.

### Exchange Student Admission

Oregon Tech welcomes exchange students through multiple exchange partnership agreements. Students at partner institutions work with an advisor at their “home” campus to meet the requirements of Oregon Tech’s international exchange application process. It is recommended that exchange students begin the exchange application process at least nine months prior to the planned date of entry. This allows ample time for submission of documents that the U.S. Bureau of Citizenship and Immigration Services requires Oregon Tech to collect before we can issue the I-20 form that is used to secure an F-1 visa.

### Admission Exceptions

The Admissions Committee and Director of Admissions retain the right to make exceptions to the specified requirements for Admission or add stipulations to certain offers of admission. For additional information, contact the Director of Admissions.

### ROAD (Registration Opportunity for Advising and Direction)

Registration for new students occurs prior to the start of each term. All students who are new to the Klamath Falls campus must attend ROAD to register for classes. In addition to placement testing and meeting with advisors to plan an academic schedule, students have the opportunity during ROAD to register for classes, set up Oregon Tech computer and e-mail accounts, receive a university ID card and learn more about making a successful transition to Oregon Tech. Students are encouraged to attend an early ROAD event rather than waiting to register at the beginning of term. Visit [www.oit.edu/road](http://www.oit.edu/road) or contact The Admissions Office (541) 885-1150 or [oit@oit.edu](mailto:oit@oit.edu) for more information.

### Placement Testing

Oregon Tech’s Center for Learning and Teaching (CFLAT) administers all placement testing for Oregon Tech students. Student admission records are examined to determine placement requirements. Students transferring in math credit for calculus or beyond, or who have transferred in math credits to fulfill all of the math requirements for their major, are exempt from the math placement requirement. Transfer students with more than 36 transferrable college credits are exempt from the reading placement requirement. Students transferring in college-level writing are exempt from the writing placement requirement. Entering students in health programs requiring Human Anatomy and Physiology with transferrable college credit for this course are exempt from the entry assessment for the Human Anatomy and Physiology course sequence. Placement tests are available prior to the term of entry and in conjunction with new student registration (ROAD). Visit [www.oit.edu/road](http://www.oit.edu/road) or contact CFLAT at (541) 885-1791 or [cflat@oit.edu](mailto:cflat@oit.edu) for more information.

## Financial Aid Programs and Application Process

*College Union, 1st Floor*  
(541) 885-1280  
[dollars@oit.edu](mailto:dollars@oit.edu)

The Financial Aid Office is committed to providing high-quality service to all Oregon Tech students, their families and the community. Our office strives to provide information on a complex topic that is accurate, easy to understand and enables students to make decisions regarding their educational funding.

The information contained in this catalog is general in nature and is not meant to serve as notification of students’ rights and responsibilities as financial aid recipients. Oregon Tech’s *Financial Aid Award Guide* serves that purpose. It is available on our website at [www.oit.edu/faid](http://www.oit.edu/faid). Additional questions regarding the application process should be directed to the Financial Aid Office.

Federal law mandates that all students apply-

ing for federal financial aid complete the *Free Application for Federal Student Aid* (FAFSA) available at [www.fafsa.gov](http://www.fafsa.gov). A federally approved needs-analysis methodology is applied consistently to information provided by all applicants. The philosophy behind financial aid is that parents and students have the primary financial responsibility for funding the student’s education.

If there are unusual financial circumstances



## Western Undergraduate Exchange

Students enrolled in some of Oregon Tech's majors are eligible for the Western Undergraduate Exchange (WUE) program. WUE can save students from the Western United States thousands of tuition dollars each year. Students from Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington, Wyoming, and Commonwealth of the Northern Mariana Islands are eligible. Students from these states who apply for WUE-eligible majors pay just 150 percent of the in-state tuition.

### Eligible Programs

All majors in the College of Health, Arts and Sciences except;

- Clinical Laboratory Science
- Dental Hygiene and pre-Dental Hygiene
- Medical Imaging Technology and pre-Medical Imaging Technology
- Nursing after acceptance by Oregon Health Sciences University

All majors in the College of Engineering, Technology and Management except:

- Renewable Energy Engineering and pre-Renewable Energy Engineering

WUE is not offered for the Oregon Tech Distance Education programs. WUE students are ineligible for the Presidential Academic Scholarship, although WUE offers the greater savings for non-resident students.

### WUE Requirements

To maintain eligibility you must:

- Remain continuously enrolled throughout fall, winter, and spring of the academic year. Summer enrollment at Oregon Tech is not required to maintain eligibility.
- Enroll in at least 12 credits per term and maintain Satisfactory Academic Standing. Students who are simultaneously admitted to Oregon Tech and a community college to allow dual enrollment must take at least 9 credits per term from Oregon Tech with a combined total of 12 credits per term. GPA and completed credits are monitored each academic year.
- Students wishing to 'stop-out' of enrollment for a term must submit a written request to the Office of the Registrar before the start of that term. Requests are granted at the discretion of the university.



that are not accurately reflected on the FAFSA, the student should contact the Financial Aid Office. Under certain conditions, professional judgment may be used and aid eligibility recalculated. The Financial Aid Office will always take the student's best interest into consideration while, at the same time, upholding federal regulations.

## Application Procedures/ Priority Deadlines

All students applying for federal and state aid must complete the *Free Application for Federal Student Aid* (FAFSA) and list Oregon Tech's school code (003211). We encourage you to file as soon after January 1st as possible to be considered for your maximum eligibility. Some funds are very limited and are expended early.

Once the FAFSA information is received and reviewed by the Financial Aid Office, new students will receive a letter instructing them on how to log into "Web for Student" to view their award letter and the federally mandated shopping sheet online. Students may accept their aid online and request changes. The Financial Aid award guide is located on our website at [www.oit.edu/faid](http://www.oit.edu/faid). It is important that students read the guide and follow the instructions on the letter they are sent. Any updates to award letters will result in an email to the Oregon Tech student email account. Returning students receive an email to their Oregon Tech email account when their award letter is ready to view online. If additional information is requested, such as tax transcripts or worksheets, students should return the documents as soon as possible to receive an *Offer of Financial Aid*. The award letter will list all types of aid for which the student is eligible. The *Award Guide* is a detailed booklet explaining programs, disbursement procedures and student rights and responsibilities, as well as cost estimates and other miscellaneous information. It is the student's responsibility as a financial aid recipient to become familiar with the contents of the *Award Guide* and contact the Financial Aid Office if additional questions or concerns arise. Additionally, students should check their **Oregon Tech e-mail accounts**

for announcements and notifications from Financial Aid.

The *FAFSA must be filed for each year* a student wishes to be considered for financial aid eligibility.

### Types of Aid

All federal and state programs are need-based with the exception of the Unsubsidized Stafford Loan and the Parent Loan for Undergraduate Students (PLUS). Students receiving federal aid are allowed to receive at maximum the cost of attendance as determined by the Financial Aid Office through all aid programs, including outside benefits such as third-party payments. Individual financial aid packages will vary based on determined cost of attendance, expected family contributions and outside resources.

### Federal Pell Grants

The estimated maximum annual Pell Grant for 2013-14 is \$5,645. Students may receive Pell Grants as long as they are attending at least half time (6 credits), but the grant will be prorated accordingly. Pell Grant eligibility is limited to those students who have not yet obtained a bachelor's degree. All students will be considered for Pell Grant eligibility if they file a FAFSA. Awards are granted based on the federally calculated expected family contribution (EFC).

### Oregon Opportunity Grant

The annual Oregon Opportunity Grant award for 2013-14 is \$2,000. This grant program provides funds to Oregon resident undergraduate students attending Oregon schools. The Oregon Opportunity Grant is awarded by Oregon Student Access Commission. Students not enrolled full time (at least 12 credits) may be eligible for a prorated part-time award if attending half time. By filing a FAFSA, students are applying for this grant. Funds are available on a first come, first-served basis and are limited. A student can receive an Oregon Opportunity Grant for a maximum of 12 terms. More information is available at [www.oregonstudentaid.gov](http://www.oregonstudentaid.gov).

### Federal Supplemental Educational Opportunity Grants (SEOG)

SEOG funds are very limited at Oregon Tech. Although priority for SEOG funds is given to full-time students, Oregon Tech may, on a case-by-case basis, award SEOG

funds to students enrolled at least half time. The typical award is \$300 for an academic year. Only students who have not yet completed a bachelor's degree and are eligible to receive a Pell Grant will be considered for this grant.

### Federal Perkins Loan

The Federal Perkins Loan Program has no origination or guarantee fees, a nine-month grace period after a student ceases to be enrolled at least half time before repayment begins and an interest rate of five percent that begins at repayment. Awards at Oregon Tech range from \$1,000 to \$2,000 per year and are based on need. Priority is given to students who are attending full time, but may also be awarded on a case-by-case basis to students attending part time.

### Federal Work-Study Program

The Federal Work-Study Program allows students to earn money by working part time on campus or at an off-campus community service site. Information regarding available jobs and application procedures are located in the Career Services Office and on the Oregon Tech website. Awards are usually \$1,500 per year, which can be earned at any time during the academic year provided the student is enrolled at least half time.

### Direct Lending

Federal Stafford Loans (subsidized and unsubsidized) are available to most students through the federal government Direct Loan Program. Loan amounts vary based on student need and grade level in a declared major at Oregon Tech. A guaranteed and origination fee may be taken at the time of disbursement. Contact the Oregon Tech Financial Aid Office for most recent interest rates for loans. The difference between a subsidized and an unsubsidized loan is that the federal government pays the interest on subsidized loans while the student is in school. Students who wish to borrow through the unsubsidized loan program should remember that interest is accruing on the loan. Interest payments can be made while in school and during the grace period, but are not required. Any interest that has accrued at the time of repayment will be capitalized. Students must fill out a promissory note before funds will be disbursed available at: [www.dl.ed.gov/borrower/BorrowerWelcomePage.jsp](http://www.dl.ed.gov/borrower/BorrowerWelcomePage.jsp) and complete entrance counseling.

### Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan

The Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan are loans offered by Oregon Institute of Technology. These loans have a 5 percent interest rate, no originations fee and repayment begins six months after students cease to be enrolled at least half-time.

Students must complete a promissory note on loan to receive the funds.

### Federal Parent Loans for Undergraduate Students (PLUS)

Parents of dependent students can apply for funds through PLUS. Loans are available for up to the cost of attendance minus other financial aid and resources each year. Interest begins to accrue immediately. Like the student loan, a four percent origination and guarantee fee may be taken at the time of each disbursement, but repayment begins 60 days after the final disbursement of the academic year. Parents may request interest payments only while the student is in school at least half time.

### Presidential Scholarships

First-time freshman applicants and transfers will receive consideration for Presidential Scholarships by applying and being accepted for admission by March 1 for the following fall term and meeting the minimum scholarship requirements. These scholarships are for fulltime students only and may be renewed for up to four years. Award levels vary depending on each recipient's academic record. For more information, go to [www.oit.edu/scholarships](http://www.oit.edu/scholarships).

### Klamath County Scholarship

The Klamath County Scholarship is automatically awarded to any applicant living in Klamath County who will attend Oregon Tech starting the fall term after graduation from high school and who is able to meet these criteria: an unweighted high school cumulative GPA of 3.0 or better; a composite SAT I score of at least 1,050 (21 ACT). To qualify, students must simply apply for admission, meet all admission requirements and be accepted for admission by March 1 for enrollment fall term. Recipients must be new full-time undergraduate students at Oregon

Tech. This scholarship is valued at \$1000 and is NOT renewable.

## Oregon Tech Foundation Scholarships

More than 150 new and returning students annually receive scholarships from many scholarships administered by the Oregon Tech Foundation. Alumni, businesses, industry, and friends of Oregon Tech generously fund these scholarships. To receive consideration, students must be currently enrolled at Oregon Tech or accepted for admission for the following fall term, and must submit an application. Application forms and deadlines are available on the Oregon Tech website at [www.oit.edu/otfscholars](http://www.oit.edu/otfscholars). The online scholarship application process is seamless for

students and automatically generates a list of scholarships the student is eligible to apply for. The winter application process opens in early December and has a deadline of March 1. For more information about scholarship opportunities, please visit [www.oit.edu/otf-scholars](http://www.oit.edu/otf-scholars).

## Leadership and Diversity Scholarships (LAD)

To be considered for the LAD Scholarship, students must submit the scholarship application (available from the Financial Aid Office and online at [www.oit.edu/scholarships](http://www.oit.edu/scholarships)). Students also should provide at least one letter of recommendation from a teacher, counselor, clergy or other appropriate reference. Candidates must be current Oregon Tech students

or have been accepted for admission for the following fall term and submit all scholarship materials by March 1. Scholarship materials should be directed to the Financial Aid Office. For more information, call (541)885-1280.

## Estimated Financial-Aid Budgets for 2013-14 Academic Year

Financial aid budgets can include amounts for tuition and fees, books and supplies, room and board and miscellaneous expenses. Please remember that these are **estimated average costs for students**, and student spending habits will vary. On a very limited, case-by-case basis, the Financial Aid Office may be able to adjust a student's budget as permitted by federal regulations.

## Students With Disabilities

Under certain circumstances, a student's aid package may be adjusted to reflect additional expenses. Please contact the Financial Aid Office if you would like additional information or to schedule an appointment.

## Consortium Agreement Information

In some cases Oregon Tech's Financial Aid Office will process a paper consortium agreement with another school in order to allow a student taking courses at another institution to receive aid from one school for all eligible classes. The school must be one that Oregon Tech does not have a dual admit program with. The institution that will be awarding the degree and awarding financial aid is defined as the "home institution"; the "host institution" is defined as the institution from which the student is taking additional courses.

When Oregon Tech is serving the "home institution," the following criteria must be met to have classes at a "host institution" apply toward financial aid:

1. The student must be fully admitted to one of Oregon Tech's degree-granting programs and eligible for financial aid.
2. The student must be enrolled at least half-time (6 credits) at Oregon Tech.
3. The classes taken at the host institution must be 100-level or higher.
4. The classes at the host institution must apply toward the student's Oregon Tech degree.

### Estimated Budgets for 2013-14 (as of March, 2013)

Standard Budgets for Fall, Winter, Spring for Full-Time Students

<b>Resident</b>	<i>On Campus</i>	<i>Off Campus</i>	<i>With Parent</i>
Tuition	\$ 5,926	\$ 5,926	\$ 5,926
Fees	\$ 1,470	\$ 1,470	\$ 1,470
Room and Board	\$ 8,400	\$ 8,307	\$ 2,469
Books and Supplies	\$ 1,100	\$ 1,100	\$ 1,100
Miscellaneous	\$ 2,526	\$ 2,526	\$ 2,526
<b>Total</b>	<b>\$19,422</b>	<b>\$19,329</b>	<b>\$13,491</b>

<b>Non-Resident</b>	<i>On Campus</i>	<i>Off Campus</i>	<i>As of this printing, the tuition and fees for Oregon Tech were not finalized. The proposed rates are as follows for the 2012-13 academic year.</i>
Tuition	\$19,239	\$19,239	
Fees	\$ 1,470	\$ 1,470	
Room and Board	\$ 8,400	\$ 8,307	
Books and Supplies	\$ 1,100	\$ 1,100	
Miscellaneous	\$ 2,927	\$ 2,927	
<b>Total</b>	<b>\$33,136</b>	<b>\$33,043</b>	

- Tuition is based on 13 credits, 2013-14 carrying load.
- Fees based on full time enrollment.
- Budget is based on \$498 per month rent, \$271 per month food and \$163 per month utilities for off-campus students.
- Miscellaneous expenses include medical supplies, entertainment, personal care products, housekeeping supplies, travel and transportation.
- CLS/PAR, RCP and Dental Hygiene/La Grande have a different budget. Please consult the Oregon University System fee book.
- A one-time matriculation fee is assessed first-term students.
- MIT externs have a different budget which includes increased costs for major medical insurance, internet and additional credits.
- A single parent may double the budgeted housing figures with documentation.
- Students enrolled in health professions majors have higher fees. Students may request actual fees to be added to budgets by the Financial Aid Office.
- Budget increase for computer is \$1,500 maximum with documentation.
- Please visit [www.ous.edu/factreport/tuition](http://www.ous.edu/factreport/tuition) for the most current information.

5. The classes taken at the host institution must not be offered by Oregon Tech during the term of enrollment.

It is the student's responsibility to ensure that both the "host" and the "home" institutions complete the appropriate consortium agreement. Consortium agreement forms are available at [www.oit.edu/faid](http://www.oit.edu/faid) under "forms." Students must provide Oregon Tech's Finan-

cial Aid Office with a final grade report from the "host institution" prior to receiving aid for future terms.

### Dual Admitted Students

Oregon Tech has formal dual admit partnerships with multiple community colleges throughout the state. Please go online [www.oit.edu/prospective-students/academic-agreements/dual-enrollment](http://www.oit.edu/prospective-students/academic-agreements/dual-enrollment) to view them.

Students who are dually admitted may be able to combine credits at both schools for full time enrollment. If Oregon Tech is the home school (giving aid) student must be enrolled in six credits at Oregon Tech. Enrollment and grade information will be transmitted electronically. Credits at the host school need to be applicable to the Oregon Tech degree.

## Residency

In Oregon, as in all other states, tuition at publicly supported four-year universities is higher for non-resident students than for resident students.

The rules used in determining residency seek to ensure that only bona fide Oregon residents are assessed the resident fee. Please see

[www.oit.edu/registrar](http://www.oit.edu/registrar) for the latest version of the residency policy.

## Reciprocity Agreements

Students from some Northern California counties may be eligible to attend Oregon Tech under reciprocity agreements with College of the Siskiyous, College of the Redwoods, and Shasta College. Reciprocity can allow selected students to attend Oregon

Tech at in-state tuition rates. To find out if the community college in your area participates in these reciprocity agreements, contact its Admissions Office directly for further instructions. Each participating college has certain restrictions, which may include the

county of the student's residence, required enrollment for a period of time first at the community college, the student's major, and how many reciprocity permits the college issues.

## Tuition and Fees

(541) 885-1235

Fees and deposits in all Oregon state institutions of higher education are charged according to a uniform plan, varying on different campuses according to differences in conditions or nature of coursework offered. The State Board of Higher Education reserves the right to make changes in fee schedules without notice.

Below are listed the estimated fees paid by students regularly enrolled for undergraduate and graduate study. Payment of full-time fees entitles students to use the library. Students may receive medical attention from the Student Health Center, use the fitness center (Tech Fit Center) and other student services. No reduction in fees is made for students who do not wish to access these services.

The estimated fee schedule for the 2013-14 academic years is provided for planning purposes only. Fees are subject to change. The current fee schedule is available from the Business Office, Registrar's Office or on the University's website.

## Special Fees

All special fees are subject to change without notice.

### Application Fee (Not refundable)—\$50

Must accompany admission application.

### Matriculation Fee (Not refundable)—\$150

A one-time fee assessed to all new Oregon Tech students.

### PDF Transcript—\$15

### Petition to Graduate Fee—\$56

### Late Fee Payment—\$99

Students paying fees after scheduled payment dates of any term can be charged a late charge of \$99.

### Late Fee to Add, Drop or Withdraw—\$20

### Return-of-Check Fee—\$25

If institutional charges are met by a check which is returned because of any irregularity for which the student is responsible, a fine

will be charged. The late payment fee will be added to the returned-check charge where the returned check was used to pay tuition and fees.

### Special Examination Fee, per credit—\$50

Examination for credit.

### Lifetime Transcripts —\$40

A one-time fee assessed to all new and transfer students for a lifetime transcript request. Official Transcripts are issued at no charge.

### Health Care Management Curriculum Tuition

Tuition is assessed an additional 15 percent for courses specific to the Health Care Management curriculums.

### Engineering/Engineering Technology Curriculum Tuition

All programs in Engineering/Engineering Technology are assessed an additional 5 percent tuition for the 2013-2014 year.

### Special Course Fees, per course

Special fees, in addition to regular tuition, are assigned for some courses. These fees are noted in the *Schedule of Classes* for each term.

### Room and Board Costs

The 2013-14 estimated annual room-and-board costs range from \$7,885 to \$9,486, depending on room type and amount of food purchased. Room-and-board charges are assessed by term. Fees are due in accordance with the same fee payment schedule as exists for tuition. Generally, payments are due during the first week of the term.

### Senior Citizen Instruction Fee

Per-credit hour: no charge.

Senior citizens are persons age 65 or older. Such persons are authorized to attend classes on a space-available basis. Charges for special materials, if any, are additional. Incidental fee privileges are not provided.

The senior citizen privilege is extended to persons auditing classes (not seeking credit or working toward a degree).

### Tuition and Fee Refunds

Students who withdraw from the university and who have complied with the regulations governing academic withdrawals may be entitled to certain refunds of fees assessed, depending on the time of withdrawal. The refund schedule has been established by the State Board of Higher Education and is on file in the Business Office. Included with the refund schedule is the mandated order in which financial aid must be returned to the appropriate programs for students on financial aid. All refunds are subject to the following regulations:

1. Any claim for refund must be made in writing before the close of the term in

which the claim originated.

2. An official notice of withdrawal must be completed and necessary clearance signatures filed with the Registrar's Office.
3. Refunds in all cases are calculated from the date of receipt of the application for refund or date of withdrawal, and not from the date when the student ceased attending classes, except in unusual cases when formal withdrawal has been delayed through cause beyond the student's control.

### Parking Fees

All student, staff and faculty vehicles must be registered with the Traffic Commission and operated in compliance with *Regulations Governing Traffic Control*. At the time of vehicle registration, a parking fee will be assessed in accordance with a schedule approved by the State Board of Higher Education and filed with the Secretary of State. Parking permits may be purchased at the Cashier's Office. Vehicles must be registered by the first day after classes begin. Parking Fees for 2013-14 are:

Students	Faculty/Staff	Permits
\$80/year	\$130/year	Ad'l vehicle \$10
\$40/year	\$65/term	one-term and full-year permits

### Library Fines and Charges

The following regulations govern library fines and charges:

**Books**—A fine of 25 cents per day is charged for each item overdue other than reserve books. No charges are made for the first three days late, but a charge of \$1 is assessed on the fourth day, plus 25 cents per day thereafter (maximum, \$10 each item). Separate charges apply to books borrowed from other libraries.

**Periodicals**—Magazines and newspapers have a \$1-per-day charge for each overdue item up to the maximum overdue fine.

**Reserved books**—The following fines will be charged for violation of rules governing reserve books and other restricted materials: For overdue items, 25 cents for the first hour and 25 cents for each succeeding hour, or portion thereof, until the material is returned or reported lost. In case of flagrant rule violation, a charge of \$1 per hour may be assessed, but in no case will a fine of more than \$10 be assessed.

**Recalls**—Materials needed for use in the library are subject to recall at any time. A maximum fine of \$1 per day may be imposed for failure to return promptly.

**Billing**—Borrowers failing to return materials within 40 days of the due date will be charged the replacement cost of the items plus the amount of fine (maximum fine—\$10 each item) incurred up to the time the item is reported missing. In addition, the borrower will be assessed a service charge of \$10.

**Refunds**—When a lost item for which the borrower has been billed is returned before replacement has been ordered, a refund not exceeding the replacement cost may be made at the discretion of the librarian. In cases where replacement has been ordered, no refunds to the borrower will be made.

# Academic Programs

## Degree Programs

### Klamath Falls

#### Master of Science

Civil Engineering  
Manufacturing Engineering Technology

#### Bachelor of Applied Science

Technology and Management

#### Bachelor of Science

Applied Mathematics  
Applied Psychology  
Biology  
Biology-Health Sciences  
Civil Engineering  
Communication Studies  
Computer Engineering Technology  
Dental Hygiene  
Diagnostic Medical Sonography  
Echocardiography  
Electrical Engineering  
Embedded Systems Engineering Technology  
Environmental Sciences  
Geomatics, with options in:  
    Geographic Information Systems  
    Surveying  
Health Care Management,  
    with options in:  
    Administration  
    Clinical Management  
    Radiologic Science Management  
Information Technology, with options in:  
    Accounting  
    Applications Development  
    Business/Systems Analysis  
    Health Informatics  
Management, with options in:  
    Accounting  
    Entrepreneurship/Small Business  
    Management  
    Marketing  
Manufacturing Engineering Technology  
Mechanical Engineering  
Mechanical Engineering Technology  
Nuclear Medicine Technology  
Nursing (*through OHSU School of Nursing*)  
Operations Management  
Radiologic Science  
Renewable Energy Engineering  
Respiratory Care

Software Engineering Technology  
Vascular Technology

#### Associate Degrees

##### Associate of Applied Science

Polysomnographic Technology

##### Associate of Engineering

Computer Engineering Technology  
Software Engineering Technology

#### Minors

Applied Mathematics  
Applied Statistics  
Biology  
Business  
Geographic Information Systems  
Human Communication  
Information Technology  
International Business  
International Relations  
Medical Sociology  
Psychology  
Surveying  
Technical Communication

#### Specializations

Accounting  
Entrepreneurship/Small Business  
    Management  
Marketing  
Picture Archiving and Communication  
    Systems (PACS)

#### Certificates

Accounting (*post baccalaureate*)  
Dispute Resolution  
Polysomnographic Technology

### Wilsonville

#### Master of Science

Manufacturing Engineering Technology  
Renewable Energy Engineering

#### Bachelor of Applied Science

Technology and Management

#### Bachelor of Science

Clinical Laboratory Science (*joint degree with OHSU*)  
Electrical Engineering,  
    with emphasis in:  
    Electrical Power

Microelectronics  
Optoelectronics & Lasers  
Renewable Energy Engineering  
Electronics Engineering Technology  
Emergency Medical Services (*joint degree with OHSU*)  
Embedded Systems Engineering Technology  
Geomatics  
Information Technology,  
    with options in:  
    Applications Development  
    Business/Systems Analysis  
    Health Informatics  
Manufacturing Engineering Technology  
Mechanical Engineering Technology  
Operations Management  
Renewable Energy Engineering  
Software Engineering Technology

#### Associate of Applied Science

Emergency Medical Technology-Paramedic (*joint degree with OHSU*)

#### Minors

Applied Mathematics  
Business  
Information Technology  
Psychology  
Surveying

### Online

#### Master of Science

Manufacturing Engineering Technology

#### Bachelor of Applied Science

Technology and Management

#### Bachelor of Science

Dental Hygiene (*degree completion*)  
Diagnostic Medical Sonography (*degree completion*)  
Echocardiography (*degree completion*)  
Health Care Management  
Information Technology with option in:  
    Applications Development, Systems  
    Analysis, and Health Informatics  
Operations Management  
Radiologic Science (*degree completion*)  
Respiratory Care (*degree completion*)  
Vascular Technology (*degree completion*)

**Associate of Applied Science**

Polysomnographic Technology

**Minors**

Psychology

Business

Information Technology

**Specialization**Picture Archiving and Communication  
Systems

Travel and Tourism

**Certificate**

Polysomnographic Technology

**Seattle at Boeing  
Master of Science**

Manufacturing Engineering Technology

**Bachelor of Science**

Manufacturing Engineering Technology

Mechanical Engineering Technology

**Chemeketa Community  
College****Bachelor of Science**

Dental Hygiene

**La Grande (ODS College  
of Dental Sciences)****Associate of Applied Science**

Dental Hygiene

# Introduction

For nearly 70 years, Oregon Institute of Technology (Oregon Tech) has focused on changing the lives of Oregonians by preparing them to meet the technical and management needs of business, industry and healthcare agencies. Today, Oregon Tech offers Bachelors of Science programs in engineering, engineering and health technologies, management, communication and the applied sciences. These include bachelors degree-completion programs offered online and at Wilsonville, Oregon. Oregon Tech also offers a number of associate degree programs, both online and at Salem and La Grande, Oregon.

Oregon Tech is accredited by the Northwest Commission on Colleges and Universities. Additional accreditations, licensure and approvals of individual programs are listed in the appropriate program sections of this catalog. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

Oregon Tech is authorized by the Washington Higher Education Coordinating Board (HECB) and meets the requirements and minimum educational standards established

for degree-granting institutions under the Degree-Granting Institutions Act. This authorization is subject to periodic review and authorizes Oregon Tech to offer field placement components for specific degree programs. The HECB may be contacted for a list of currently authorized programs. Authorization by the HECB does not carry with it an endorsement by the board of the institution or its programs. Any person desiring information about the requirements of the act or the applicability of those requirements to the institution may contact the HECB at P.O. Box 43430, Olympia, WA 98504-3430.

# Degree Programs

**Graduate Programs**

A Master of Science in Manufacturing Engineering Technology is offered at Oregon Tech campuses in Wilsonville, Klamath Falls, at The Boeing Company in Washington and online.

A Master of Science in Civil Engineering is offered at Oregon Tech's Klamath Falls campus.

A Master of Science in Renewable Energy Engineering is offered at Oregon Tech's Wilsonville campus.

**Undergraduate Programs**

The School of Health, Arts and Sciences includes Clinical Laboratory Science, Dental Hygiene, Health Sciences, Medical Imaging Technology, Applied Psychology, Environmental Sciences, Communication Studies, Paramedicine, Respiratory Care and Polysomnographic Technology. Nursing is offered as part of a statewide program administered by the Oregon Health & Science University. Programs in Clinical Laboratory Science and Paramedic Education are offered in Portland in conjunction with OHSU.

Medical Imaging, one of the largest bachelor's degree programs in the nation in this field, includes majors in Radiologic Science, Vascular Technology, Diagnostic Medical

Sonography, Nuclear Medicine Technology and Echocardiography.

The faculty in the School of Health, Arts and Sciences includes individuals with nationally-recognized credentials and international experience. Clinical practice and externships are included in health technology education, while the arts and sciences provide exposure to liberal studies that complement technical coursework.

The School of Engineering, Technology and Management includes these programs: Civil Engineering, Computer Engineering Technology, Electronics Engineering Technology, Electrical Engineering, Embedded Systems Engineering Technology, Geomatics, Manu-

facturing Engineering Technology, Mechanical Engineering, Mechanical Engineering Technology, Renewable Energy Engineering, Software Engineering Technology, Operations Management, Information Technology, (with options in Applications Development, Business/Systems Analysis, Accounting and Health Informatics), Management (with options in Entrepreneurship/ Small Business Management, Marketing and Accounting) and Health Care Management, with options in: Administration, Clinical Management, and Radiologic Science Management.

The School's faculty is composed of professional engineers, certified public accountants and those with corporate executive experi-

ence. From accounting to robotics, these programs include extensive laboratory time to apply the theories that are studied.

### Summer Term

Anyone may enroll in summer term. Formal admission to the university is not necessary and there are no GPA or high school diploma requirements. High school students who want to take college courses are invited to attend. Potential students who have not met the college entrance requirements may take appropriate courses during the summer to correct these deficiencies. Students may register from early May through the first day of summer school. Tuition is on a per-credit basis.

The eight-week term begins in mid-June and ends in mid-August. Four-week sessions begin in mid-June and mid-July. Classes meet Monday through Thursday and are scheduled either during day or evening hours. Many summer classes are offered online via Distance Education.

A separate Summer term class schedule is available on the web in April. This schedule provides a listing of courses, fees, registration and housing information.

## Wilsonville Programs

27500 SW Parkway Ave  
Wilsonville, OR 97070  
(503) 821-1250

Oregon Tech serves students and employers in the Portland metropolitan area by offering university degree programs at the Oregon Tech Wilsonville Campus and the Willow Creek Center (WCC) in Beaverton. Oregon Tech's high-demand BS and MS degrees are accessible to traditional full-time students, community college transfer students, working professionals, and busy adults by offering day, evening, weekend, hybrid, and online courses.

The Oregon Tech Wilsonville Campus is designed to provide an industry-focused, urban university experience at the heart of "Silicon Forest." Our mission is to serve students and employees by educating a highly trained and globally competitive workforce in engineering, technology, management, and health sciences.

Oregon Tech faculty and advisors are devoted to educating globally competitive graduates in a challenging and supportive professional environment. An Oregon Tech degree at the Wilsonville Campus blends theory and real-world practice in well-equipped laboratories and project-based courses. Industry Advisory Boards help guide the curriculum of our programs, resulting in high-demand and rigorous degrees with a strong focus on professional practice, projects, and skills.

At Oregon Tech Wilsonville, students can:

- Transfer up to 120 applicable credits from a community college, or other accredited college, depending on courses taken and degree desired.
- Earn up to 45 credits of "Credit for Prior Learning" (varies by program) through—
  - Credit by Examination: Challenge courses where you have working knowledge of the subject.
  - Credit by Portfolio: Demonstrate mastery of course outcomes through documentation.
  - Military course credit through accredited evaluation.
- Enjoy small student-to-faculty ratio in the classroom (20:1 student to professor).
- Expect industry-experienced faculty to teach classes.
- Pay public tuition rates and receive full student assistance services.
- Expect to become highly desirable employees.

The Oregon Tech degree programs offered at the Wilsonville Campus are included under the institutional accreditation by the Northwest Commission on Colleges and Universities, the same agency that accredits all Oregon University System (OUS) institutions. Additionally, ABET accredits our engineering (ABET-EAC) and engineering technology

(ABET-TAC) programs. Engineering and engineering technology programs offered at Oregon Tech Wilsonville list their respective ABET accreditation status on their website and catalog page.

Oregon Tech Wilsonville offers twelve Bachelor of Science degree programs, one Bachelor of Applied Science, one Associate of Applied Science, and two Master of Science programs.

Oregon Tech's programs include Bachelor of Science degrees in Electrical Engineering (options: Classical, Optoelectronics & Lasers, Power Engineering and Renewable Energy Engineering), Electronics Engineering Technology, Geomatics (Surveying), Operations Management, Information Technology (options: Business/Systems Analysis, Application Development and Health Informatics), Manufacturing Engineering Technology, Mechanical Engineering Technology, Renewable Energy Engineering, Embedded Systems Engineering Technology, and Software Engineering Technology. Additional degrees offered are an Associate of Applied Science in EMT-Paramedic (joint with OHSU), a Bachelor of Science in Clinical Laboratory Science (joint with OHSU), a Bachelor of Science in Emergency Medical Services (joint with OHSU), and a Bachelor of Applied Science degree in Technology and Management. At the graduate level, Oregon Tech Wilsonville offers a MS in Renewable Energy Engineering and a MS in Manufacturing Engineering Technology.



Oregon Tech also provides unique general education courses that complement a foundation of general education courses offered by community colleges and other educational institutions in the region.

All programs are offered in cooperation with other OUS institutions and area community

colleges. While most courses are offered at the main Oregon Tech campus in Portland located in Wilsonville (Oregon Tech Wilsonville), some programs are also offered on the Portland Westside (Beaverton) to better serve Silicon Forest business and working professional students in the Hillsboro and Beaverton area.

A schedule of degree-related courses for Oregon Tech Wilsonville is published on the Oregon Tech website about six weeks prior to each term. Information can be obtained through the Oregon Tech Wilsonville administrative office or accessed at [www.oit.edu/wilsonville](http://www.oit.edu/wilsonville).

## Seattle at Boeing

(425) 965-9707  
[www.oit.edu/seattle](http://www.oit.edu/seattle)  
[oitseattle@oit.edu](mailto:oitseattle@oit.edu)

facturing Engineers' CMfgT and CMfgE exams and a Certificate of Completion in Composites.

Oregon Tech offers Bachelor and Master of Science Degrees in Manufacturing Engineering Technology and a Bachelor of Science Degree in Mechanical Engineering Technology to employees of The Boeing Company at sites in the Puget Sound area. Also offered are review classes for the Society of Manu-

## Distance Education

Boivin Hall, 186  
 (541) 885-1142  
[de@oit.edu](mailto:de@oit.edu)

The primary mission of Distance Education at Oregon Tech is to offer convenient programs for degree completion and graduate education. Oregon Tech currently offers one graduate program online, the Master of Science in Manufacturing Engineering Technology. Working adults, particularly those registered or licensed in an array of allied health professions, may easily utilize these web-based offerings. Currently, Oregon Tech offers degree completion programs in Diagnostic Medical Sonography, Echocardiography, Radiologic Science, Vascular Technology, Dental Hygiene, and Respiratory Care. Typically, students in these programs will start distance education from a foundation for degree completion built on two sources:

1. Credit completed at another school that will transfer to Oregon Tech; and
2. Substantial credit granted for past experience and/or registry or licensure in their profession.

Students who wish to be admitted to Radio-

logic Science, Vascular Technology, Echocardiography, Diagnostic Medical Sonography, or Respiratory Care programs must meet all regular admission requirements and be professionals working in their chosen field. This will assure access to clinical sites as required in these programs.

Oregon Tech also offers a distance program leading to Bachelor of Science degrees in Information Technology and Operations Management. Although most of the coursework for these majors may be completed through online delivery, a handful of courses may require students to complete on-site laboratory work in Portland or Klamath Falls. Students from outside the area may complete these requirements by transferring approved courses from another college or university.

A degree in Health Care Management is available for students who have earned licensure or registry in selected allied health fields.

The Master of Science in Manufacturing Engineering Technology is delivered fully online with no residency requirement.

In addition, Oregon Tech offers a Bachelor of Applied Science in Management and Tech-

nology. This degree is designed for students with associate degrees and technological careers to improve their employment opportunities by obtaining a bachelor's degree.

Oregon Tech also offers a certificate program and an Associate of Applied Science degree in Polysomnographic Technology.

Additionally, Distance Education offers online courses leading to a minor in Information Technology, which can be completed in conjunction with a degree program at Oregon Tech or Eastern Oregon University; certification in Picture Archiving Communication Systems (PACS); as well as minors in Business and Psychology, a specialization in Travel and Tourism, and a bank of online general education courses open to all Oregon Tech students.

Distance education classes are offered on a 10-week quarter-based academic calendar. They are paced to keep students on track, while allowing them to complete weekly assignments at their convenience.

# Youth and High School Programs

(541) 885-1668

[www.oit.edu/programs/youth-programs](http://www.oit.edu/programs/youth-programs)

Oregon Tech's Youth Programs offers innovative and energizing pre-college educational outreach programs designed to encourage K-12 students to pursue educational and career goals in science, technology, engineering and mathematics (STEM). The goals of our programs are to:

1. Increase understanding and interest in STEM careers among participants;
2. Build confidence in their technical abilities; and
3. Introduce them to role models and mentors.

## Youth Camps

### GEAR UP

A series of special programs, created in partnership with Oregon GEAR UP, to ensure that Oregon's low-income middle school and high school students are prepared for, pursue and succeed in post-secondary education.

### I'm Going To College

In partnership with NELA, this day program brings sixth-grade students to campus to expose them to college. The students attend classes, tour Oregon Tech, and have lunch. A follow-up meeting with parents will be hosted by students' schools.

## MATHCOUNTS

An annual competition in February that challenges students' math skills, develops their self-confidence and rewards them for their achievements. Open to sixth-, seventh- and eighth-grade students in the Klamath Basin, this program gives students the opportunity to participate in individual and team competitions. The top students advance to the state and national levels.

Summer programs include: DayDreamer, LEGO Beginners and LEGO Challenge.

# High School Programs for College Credit

(541) 885-1844

## Advance Credit Program

The Advance Credit Program (ACP) is a partnership between Oregon Tech and the participating high school to offer qualified high school students the opportunity to receive college credit from Oregon Tech. Oregon Tech is partnered with more than 20 high schools and offers more than 15 introductory college courses. The Advance Credit Program consists of college courses taught in the high schools by college-level qualified high school instructors. These courses are offered as part

of the regular high school curriculum with the option of registering for college credit from Oregon Tech. ACP gives students the opportunity to try college-level courses, gain valuable skills, and develop study habits for college.

## High School Transition Program

The High School Transition Program (HST) at Oregon Tech gives qualified high school students the opportunity to come to the Klamath Falls or Wilsonville campus and take a college course for Oregon Tech credit. Students must be 14 years or older and are

typically eligible to take 100- and 200-level courses. High school students must register through the Office of Academic Agreements.

The ACP and HST Programs allow Oregon Tech to reduce the normal tuition fee by a considerable amount. Cost to the participating high school student is \$25 per credit.

For more information on these programs please visit [www.oit.edu/programs/youth-programs](http://www.oit.edu/programs/youth-programs).

# Academic Policies and Procedures

## Procedures and Regulations

### Student Responsibility

Students are responsible for knowing and understanding Oregon Tech's requirements relating to registration, academic standards, student activities and student organizations. A partial view of academic regulations is included in the class schedule introduction pages on Oregon Tech's website and distributed to new students during their first registration at Oregon Tech. Students are encouraged to meet regularly with their departmental advisors and to contact the Registrar's Office with questions about academic procedures, policies or regulations.

### Academic Advising

Students are assigned faculty advisors from their academic programs. Advisors maintain a file on students' progress and help them plan course loads. If a student should change programs, a new advisor will be assigned. The student's advising file will be transferred to and maintained by the new advisor. Degree-seeking students are required to meet with their advisors prior to registration.

### Student Classification

In the Oregon University System, students are classified according to the number of college-credit hours earned as follows: 0-44, freshman; 45-89, sophomore; 90-134 junior; 135 and above, senior. Transfer credits are included in determining classification.

### Quarter System

Oregon Tech operates on an academic year consisting of three quarters (or terms) of approximately 10 weeks each and a summer session of eight weeks.

## Advanced Standing

### Credit for Prior Learning

Credit for prior learning by a student admitted to Oregon Tech may be granted through a number of independent processes. These include: A) Transfer Credit; B) Military Credit; C) College Level Examination Programs (CLEP) and Advanced Placement credit (AP); D) Credit for National Registry

### Academic Progress and Petitions Committee

Administration of the regulations governing academic requirements is vested in the Academic Progress and Petitions Committee. This committee also has authority to assess probation or to suspend any student from the university when it appears that the student's work is at such a level that the student cannot benefit by continued attendance. The university requires that students make substantial progress toward meeting graduation requirements, including maintaining a minimum 2.0 GPA. Any institutional cumulative GPA below 2.0 is considered unsatisfactory and will bring the student's record under review.

The Academic Progress and Petitions Committee also serves as an advisory group to the Registrar's Office regarding academic appeals. For information regarding appeals to this committee, students may contact the Registrar's Office.

### Admissions with Special Conditions

If a student is admitted with one or more stipulations and fails to meet any of the prescribed condition(s), that student may be referred to the Academic Progress & Petitions (AP&P) Committee for possible academic disciplinary action, up to and including probation and suspension from the university. The request for review by AP&P can be made by any member of the Admission Committee.

### Academic Warning

An academic warning is a caution to the student that there is a lack of satisfactory aca-

demical progress. Students, including first term freshmen, who do not achieve a 2.0 in any given term will receive an Academic Warning. Students who have no earned credits, withdrawals (i.e., all Fs, withdrawals (W) and/or incompletes (I)), for two consecutive terms will also receive an Academic Warning.

### Academic Probation

Students who have attempted two or more terms at Oregon Tech and have an Oregon Tech cumulative GPA below 2.0 will be placed on Academic Probation. Students who have no earned credits, (i.e. all Fs, withdrawals (W) and/or incompletes (I)), for three or more consecutive terms will also be placed on Academic Probation. Students placed on probation will receive notification that they are on Academic Probation as well as instructions on how to proceed. Once placed on probation, students are advised to limit their course load to 13 credits.

### Academic Suspension

Students on academic probation for one term who do not meet the 2.0 cumulative GPA requirement in the successive term of enrollment will be placed on Academic Suspension for at least one term. To re-enroll, a student must complete the prescribed procedures and appeal to the Academic Progress and Petitions Committee for reinstatement. Students should contact the Registrar's Office for re-enrollment information. Students who have been suspended are denied all privileges of the institution.

Note: When a student is placed on academic warning, probation or suspension both the student and their advisor will be notified.

or Licensure Exams; E) Credit by Examination; and F) Credit for Prior Experiential Learning. A number of these categories are for credit that is awarded for educational accomplishments attained outside of accredited post-secondary institutions.

These procedures describe the process used to

grant the student appropriate academic credit by each of these methods as follows.

### A. Transfer Credit

Oregon Tech makes every effort to give maximum consideration to the transfer work presented by enrolling students. To ensure that the student has the requisite knowledge,

Oregon Tech follows these policies in determining credit:

### Accreditation Status of Institution

The institution where the transfer credit was earned must be accredited by an accrediting body recognized by the Council for Higher Education (CHEA).

Students transferring work from an institution that is not accredited by a CHEA-recognized accrediting body may receive transfer credit by 1) demonstrating prior experiential learning with a portfolio, 2) applying for credit after demonstrating competencies in advanced coursework in the same subject area or 3) challenging courses by exam.

### International Institutions

Students seeking transfer credit from international institutions must provide Oregon Tech with a credential evaluation from an Oregon Tech-approved credential evaluation service. Credential evaluation information may be obtained from the Office of Admissions. The credential evaluation must include course titles, credits and grades. Students must also provide course descriptions in English from the international institution. Any associated costs are the responsibility of the student.

### Official Transcripts

Prior to the formal awarding of transfer credit, the transfer student must provide an official transcript of coursework completed at all other higher education institutions. Failure to list all colleges attended on the Application for Admission may result in denial of admission or transfer credit.

Admitted transfer students must submit official transcripts at least one term prior to enrollment to ensure timely evaluation of transfer credits.

### Determination of Transfer Credit

The Oregon Tech Registrar's Office determines the transfer equivalency of general-education courses using articulation agreements, course descriptions, course outlines, and course syllabi. The student's major department determines the transfer equivalency for technical or major courses using similar resources.

### Articulation Agreements

Oregon Tech is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major with the least overlap or repeat of courses. Some agreements accept an associate degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at [www.oit.edu/articulations](http://www.oit.edu/articulations); students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the students' academic department or the Office of Academic Agreements.

### Applicability of Transfer Credit

Oregon Tech provides a complete, written transfer evaluation upon the admission of the student, prior to the planned term of enrollment. The evaluation delineates the transfer credit on a course-by-course basis and specifies direct course equivalencies, courses which may be used towards general education requirements, elective credits and courses which do not receive credit.

At the time of admission, Oregon Tech's written transfer evaluation may include elective credits that do not apply towards a specific degree. These credits will be recorded as transfer credit for registration purposes, allowing the student an earlier registration appointment based on total earned credit hours.

Some transfer work, which may not be directly equivalent to Oregon Tech courses, may be appropriately substituted to meet Oregon Tech requirements. Students may seek course substitution approval by completing the Course Substitution form and obtaining the signature of the advisor, department chair and University Registrar.

### Credit for Alternative-Delivery Courses

Courses taken by alternative delivery from other accredited institutions will be evaluated as transfer credit.

### Minimum Grade Standards

Oregon Tech considers for transfer those courses that carry a grade of D or better from an accredited institution. However, many Oregon Tech departments require C or better course grades for prerequisite and graduation purposes. Oregon Tech does not normally transfer math courses with a "D" grade.

### Pre-College Level Transfer Credit

Oregon Tech does not accept for transfer credit courses that are considered pre-college or vocational. Oregon Tech determines the level and nature of the course by examining the catalog description and course numbering system of the student's prior college.

### Pre-Approval of Transfer Credit

Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absentia are encouraged to obtain written pre-approval of transfer credit to ensure transfer equivalency for degree purposes.

### B. Military Credit

Oregon Tech will grant credit for military courses and experiences based on American Council of Education (ACE) guidelines (found in the Guide to the Evaluation of Educational Experience in the Armed Forces) and faculty recommendations. Credit is awarded in accordance with transfer credit policies at Oregon Tech and the Oregon University System. Students may request evaluation of military credit by furnishing an official AARTS or SMART transcript.

### C. College-Level Examination Programs and Advanced Placement: College Level Examination Program (CLEP)

Oregon Tech will award credit for several college-level examination programs. These examinations must be completed with a satisfactory score and an original copy of test results must be forwarded to the Registrar's

Office from the testing service. In order to receive such credit, the student must be admitted to an Oregon Tech degree program and registered for classes during the term in which the request is made. Oregon Tech awards credit for College-Level Examination Program (CLEP) subject examinations, but not for CLEP general examinations. Information on CLEP course equivalencies and minimum scores may be obtained from the Oregon Tech Registrar's Office.

### Advanced Placement (AP)

Students who complete college-level work in high school under the Advanced Placement (AP) program must achieve a minimum score of three to be granted credit on their Oregon Tech transcript. AP course equivalencies may be obtained from the Office of Admissions or Registrar's Office.

A maximum of 25 percent of the credits used toward the degree may be CLEP and AP.

### International Baccalaureate

Oregon Tech evaluates IB test scores much in the same way it evaluates AP scores. Students must have official test scores sent to the Office of Admissions. Oregon Tech may award credit to students who receive a 5 or higher on any Higher Level IB examination. No credit is awarded for Subsidiary Level exams. For more information, please contact the Registrar's Office at (541) 885-1300.

### D. Credit for National Registry or Licensure Exams

Oregon Tech will award a pre-approved block of credit to fully admitted and enrolled students who have passed a national registry or licensure exam in majors offered by the institution. This award of credit is based on the academic department's annual review of the national exam questions in comparison to the curriculum taught on campus. Full information is maintained in the Registrar's Office and in the Office of Distance Education, which coordinates online degree completion programs offered by Oregon Tech.

### Credit by Examination and Credit for Prior Experiential Learning

Oregon Tech awards credit for educational accomplishments attained outside of accredited postsecondary institutions.

### E. Credit by Examination

Students currently enrolled at Oregon Tech may request credit for a course by special examination. This process is called a course challenge and the provisions are:

1. Credit by examination (course challenge) is available to students who are fully admitted in degree-granting programs.
2. Students may not challenge a course which they have previously taken for credit and received a grade other than an audit, nor may they challenge the same course more than once. If students register for a course they wish to challenge, they must drop and challenge the course before the last day to drop without a "W".
3. No more than 25 percent of the credits submitted for graduation may be credit by examination.
4. Credit by examination counts toward graduation residency requirements. For a bachelor's degree, students must complete 45 credits at Oregon Tech with the last 15 to be taken on campus. For the associate degree, students must complete 30 credits with the last 15 to be taken on campus.
5. Examinations receive either a "P" (pass) or "F" (fail). A pass suggests the student has mastered the material comparable to a grade of "C" or better in the course being challenged. The University Registrar records "P" grades on the student transcript, but does not count the P in grade point average calculations. The University Registrar does not record "F" grades.
6. Students must pay a non-refundable per-credit fee, as published by the Office of Business Affairs, prior to the examination.
7. Departments are responsible for preparing an appropriate examination, evaluating the student's response and submitting results to the Registrar's Office. Departments reserve the right to declare any course offering as non-challengeable.

Further procedures and general guidelines for course challenges may be obtained from the Registrar's Office.

### F. Credit for Prior Experiential Learning

Oregon Tech recognizes that students learn outside the classroom through experiences on the job, vocational education, professional development courses, workshops, and independent study. Oregon Tech may grant credit for experiential learning when it is judged to be equivalent to college-level courses in the Oregon Tech curriculum. This process is only appropriate for students who wish to demonstrate learning for more than one required course. Typically, credit for experiential learning will replace a series of major specific courses.

#### Level of Credit

Oregon Tech grants credit for prior experiential learning at the undergraduate level only. Credit will be awarded only for documented prior learning that has a balance, appropriate to the subject, between theory and practical application, and not just for prior experience. Credit should be appropriate to the academic context in which it is accepted.

#### Eligibility Requirements

The student must be fully admitted and enrolled at Oregon Tech. Credit will not be granted until the student has successfully completed the procedure outlined. Credit for prior experiential learning will not be granted if the student has already received credit for the same course. No more than 25 percent of the credits needed for a degree or certificate may be from credit for prior experiential learning. Credit may only be granted for courses offered by Oregon Tech and the university reserves the right to declare any course offering as inappropriate for prior experiential learning credit.

#### Awarding of Credit

Completion of the institution's review process does not guarantee a student will receive credit for prior experiential learning. If the student successfully demonstrates evidence of college-level learning, credit will be identified on the student's transcript as credit for prior learning. This credit will not be graded or counted in the student's grade point average. Students wishing to appeal the award of credit should appeal to the Provost, whose decision is final.

### **Tuition and Fees**

Fees charged for portfolio assessment are based on the services performed. The application fee for a specified course is published by the Office of Business Affairs. This non-refundable fee must be paid prior to submitting the portfolio for assessment. Proof of payment must accompany the student's Credit for Prior Experiential Learning Application.

### **Transfer of Prior Experiential Learning Credit**

Oregon Tech accepts credit for prior learning from other institutions, provided that the transfer institution awards such credit on the basis of standards similar to those outlined by the Northwest Association of Colleges and Universities (NWCCU).

### **Faculty Evaluator Qualifications**

Credit is awarded based on the recommendation of teaching faculty who are qualified in the subject area, who have adequate training in portfolio evaluation and who are on regular appointment with the university on a continuing basis.

### **Procedure**

Students seeking credit for prior experiential learning should first confer with their advisor to help assess if their experience and learning are appropriate for this process. If it is determined that experiential learning assessment is appropriate, the student should contact the University Registrar.

The University Registrar will determine whether the student has met the eligibility requirements outlined in this procedure. If so, the University Registrar and the Department Chair will sign the student's Credit for Prior Experiential Learning Application. The student must then complete a prior experiential learning documentation course. This course may be utilized for curricular requirements by the major department if appropriate.

Upon completion of the documentation course, the student will submit his/her Credit for Prior Experiential Learning Application and completed portfolio to the appropriate faculty evaluator as determined by the department chair. The faculty member will review the portfolio and if necessary will interview

the student. Review of the portfolio will ensure that the learning experience demonstrates the theories, competencies, and outcomes of the academic subject matter. When appropriate, the faculty member may choose to consult with others who have expertise in the subject matter before making a decision as to whether or not to grant credit. The final decision is recorded on the student's Credit for Prior Experiential Learning Application and will be forwarded to the University Registrar. The Credit for Prior Experiential Learning Application will be included in the student's permanent academic record. The portfolio will be retained in accordance with Oregon Tech's archive guidelines.

# Grading System

Student academic achievement is evaluated and reported in accordance with a system of letter grades assigned at the end of each course. These grades become part of the student's transcript, a permanent academic record. A summary statement of a student's total academic record is expressed as a cumulative grade point average (GPA).

## Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student's performance will be graded by the instructor and reported to the University Registrar as follows:

Letter Grade	Meaning	Points Per Credit Hour	Used to Calculate GPA
A	Exceptional	4	Yes
B	Superior	3	Yes
C	Average	2	Yes
D	Inferior	1	Yes
F	Failed	0	Yes
I	Incomplete	0	No
IP	In Progress	0	No
N	Audit	0	No
NP	No Pass: <i>Equated to a "D" or "F"</i>	0	No
P	Pass: <i>Equated to a "C" or better</i>	0	No
W	Withdrawn	0	No
Z	No Grade Assigned	0	No

## Grade Change Policy

All grades except for 'I' and 'IP' are final when filed by the instructor during grade processing each term. Thereafter, a grade change may be made only in the case of clerical, procedural or calculation error. No grade other than 'I' or 'IP', once reported, may be revised by re-testing or by completing additional work. Any grade change by the instructor of record must take place within one year subsequent to the term in which the grade was reported. Any grade change that is to be filed later than one year must be approved by the Dean and the Registrar.

## Non-Standard Grading

Courses may be graded on the pass (P)/no pass (NP) basis at the discretion of the department and the University Registrar. Courses may include, but are not limited to

seminars, externships, co-ops, independent study, certificate classes, and physical education.

## Class Drop/Withdrawal Policy

A student may drop/withdraw from a course through Friday of the seventh week of the term. Although teaching faculty may drop a student during the first two weeks of the term, according to the Faculty Initiated Withdrawal Policy, they are not required to do so. Students will be notified of instructor-initiated drops in writing.

## Faculty-Initiated Withdrawal Policy

Teaching faculty can drop a student during the first two weeks of the term from a class if the student has not attended by the second regularly scheduled meeting of that class. The student will be notified of the withdrawal in writing by the Registrar's Office.

## Student Initiated Drops/Withdrawals

1. During the first 10 days of the term, a student may drop one or more courses with no record. However, if a student withdraws from all courses, the student's transcript will note "Complete Withdrawal."
2. After the first 10 days of the term, a student who withdraws from one or more courses will receive a "W" for those courses. Students may withdraw from

individual courses through Friday of the seventh week of the term.

3. After Friday of the seventh week, students will receive a letter grade ("A", "B", "C", "D", "F", "P", "NP", "I" or "IP") from the instructor.
4. Complete withdrawals from the university may be processed through Friday of the week prior to final-exam week. Depending on the time of the term, a complete withdrawal will result in a notation of a "complete withdrawal" or "Ws" on the student's transcript.
5. Students requesting to withdraw from a course(s) after the published withdraw dates that have medical documentation supporting the withdraw should contact the Registrar's Office.

*NOTE: The deadlines for dropping/withdrawing from a course are listed in the Academic Calendar.*

## Incompletes

When the quality of a student's work is satisfactory, but some essential requirement of the course has not been completed for reasons acceptable to the instructor, a grade of Incomplete (I) may be assigned and additional time granted for completion. The instructor is responsible for submitting an "I" grade and completing the Request for Incomplete form and submitting it to the Registrar's Office.

An "I" grade must be removed by the end of the next term (summer session not included).

## Grade Point Average

A student's GPA is computed by assigning a numerical point value to each grade: "A," 4 points per credit; "B," 3 points per credit; "C," 2 points per credit; "D," 1 point per credit; "F," 0 points per credit. GPA is the quotient obtained by dividing total grade points by total hours attempted. Grades of "I", "P", "NP", "W" and "N" are disregarded in calculating GPA; however, a "P" is equivalent to a "C" or better. For example:

Class #	Title	Credits	Grade	Point Value for Credits	Earned Grade
WRI 121	English Composition	3	B	3	9
ECO 201	Economics	3	C	2	6
MATH 111	College Algebra	4	A	4	16
CHE 101	Elementary Chemistry	3	B	3	9
CHE 104	Elementary Chemistry Lab	1	B	3	3
HED 250	Contemporary Health Issues	2	A	4	8
PHED 190	Racquetball	1	B	3	3
				<b>Total</b>	<b>54</b>

GPA = Sum of earned grade points =  $\frac{54}{17} = 3.18$   
Credits attempted 17

An “I” may only be extended under the most extenuating circumstances and then only for one additional term. If an “I” is not removed within the allotted time, the “I” then reverts to the alternate grade assigned by the instructor on the incomplete form.

Incompletes received in the anticipated term of graduation must be finished and the grades recorded in the Registrar’s Office within three weeks after the end of the final term. Otherwise, the diploma will be delayed until the term during which all degree requirements are met.

### In Progress (IP) Grade

The ‘In Progress’ grade is used for classes with coursework that continues past the end of the term in which the student is registered. Examples include externship, co-op, clinical and project classes. The ‘IP’ grade may be retained over multiple terms. ‘IP’ grades that are not changed during the allotted time revert to a grade of ‘F’ for undergraduate and graduate courses.

‘IP’ grades given at the undergraduate level will be retained for a maximum of four terms. The ‘IP’ grade for a specific graduate level course is maintained by the Registrar’s Office for a maximum of five years. Each year the student should file a progress report with the Graduate Council signed by the student and the student advisor. After five years, the student can appeal to the Graduate Council to request a grade change beyond this five-year limit. The Graduate Council has the authority to approve or deny the student’s petition.

### No Grade Assigned (Z) Grade

The ‘No Grade Assigned’ grade is a grade assigned by the Registrar’s Office when no grade is reported by the instructor. A ‘Z’ grade should be changed by the instructor as soon as possible. If a ‘Z’ is not removed by the completion of the following term, the ‘Z’ reverts to a grade of ‘F’.

### Academic Term Honors

*President’s List* (Applicable to full-time students only)

Each term, students with a GPA of 3.70 or better are included on the President’s List.

*Dean’s List* (Applicable to full-time students only)

Each term, students with a GPA of 3.30-3.69 are included on the Dean’s List.

### Repeat Policy

The following restrictions apply for course-repeat situations:

1. Students may attempt the same course (for a “W” or a letter grade) a total of four times.
2. Each withdrawal (“W”) is considered an attempt. Withdrawals, however, are not included in GPA calculations.
3. The new grade earned will replace the previous grade(s) when computing GPA. Only the first two earned grades will be excluded for GPA calculations. The last grade earned will be used on the petition to graduate.
4. All grades and credits remain on the student’s official transcript.

*NOTE: Students should consult with their financial aid counselor to determine financial eligibility for repeat courses.*

### Auditing Policy

A student has the option to enroll in a class for informational purposes only. This enrollment is classified as an audit and is regulated by the following procedures:

1. Audit classes are charged at regular tuition rates as printed in the class schedule.
2. The only grade an audit class may be granted is “N” (audit). The “N” grade is disregarded in the GPA and is not valid toward graduation requirements.
3. Class attendance shall be in accordance with the instructor’s attendance policy for all students in the class.
4. Instructors having audit students have no obligation to grade or record the audit student’s work.
5. An audit option may be requested during the registration period. Changes “to” or “from” the audit option may be requested no later than the 10th academic day of the term.
6. Students auditing a course may, at a later term:
  - a. Register for the same course for credit.
  - b. Challenge the course by examination.

### Excessive Course Load

Admitted students are allowed to register for 21 credit hours (including audits) during an academic term without special permission. Fifteen credits are the maximum for summer session. Students wishing to register for an overload must have a 3.0 cumulative GPA and receive special approval from the advisor and the University Registrar. Appeals may be considered for special circumstances. The class schedule will provide associated tuition costs each term.

Non-admitted students are restricted to eight credits per term, with the exception of summer, where 15 credit hours are the maximum.

### Substitution Within the Curriculum

Students desiring to depart from the curriculum prescribed in the catalog should contact their departmental advisor to begin the process. It is the responsibility of the student to file a petition with the Registrar’s Office for such changes. Substitution forms must be approved and filed prior to or with the petition for graduation in order to assure acceptability toward meeting graduation requirements.

### Dead Week Policy

Dead Week (the period of Monday morning prior to finals week until the Monday morning of finals week) is the last week of regularly scheduled activities for the term. As such, Dead Week includes routine activities (e.g., lectures, discussions, laboratories, quizzes, assignments, appropriate course reviews, etc.).

1. Final examinations, when utilized, must be given at the scheduled time during finals week.
2. No student activities or athletic events will be scheduled during Dead Week.
3. Projects and/or examinations due Dead Week may not exceed 20 percent of the final course grade without giving students at least three weeks prior notice.

The appropriate vice president must approve any exceptions to this policy.



## Final Exams

All teaching faculty will meet their classes during finals week at the final-examination time designated in the official class schedule issued at the beginning of each term.

1. No student activities or athletic events will be scheduled during finals week.
2. Methods of evaluation are at the discretion of the instructor. They should be specified in the course syllabus and distributed to students the first week of class.
3. Faculty who use a final examination will administer that exam at the time designated in the official class schedule. Finals times are designed not to conflict.

Individual students may request exceptions to this policy. These must be approved in advance by the instructor.

Course instructors may request exceptions to this policy. The exception must be approved by the dean of the school and students should be given at least three weeks prior notice of the change.

## Academic Forgiveness

The Academic Forgiveness policy allows undergraduates with an unsatisfactory GPA to drop a maximum of three consecutive terms of work from consideration in their GPA. Academic forgiveness applies to terms only. Students are not allowed to select courses within terms for forgiveness.

Academic forgiveness is granted on a case-by-case basis by the Academic Progress and Petitions Committee. It is an extreme measure; it may be granted only once and only when a student provides clear and convincing evidence of a renewed commitment to advancing his or her education. Once forgiveness is granted, it may not be revoked. Forgiveness can be applied only to credits earned at Oregon Tech.

If the petition is approved, the student's transcript will have a notation stating, "Academic Forgiveness Granted" above each term in which forgiveness was granted. Forgiven courses and grades are no longer calculated in the GPA and do not apply toward graduation. However, a record of all coursework will remain on the transcript.

## Eligibility

To apply for consideration for academic forgiveness a student must:

1. Have earned less than a 1.0 term GPA for the term(s) being considered for forgiveness. The term(s) for which forgiveness is being requested must have been taken at least seven years prior to the request;
2. Have had at least a two-year lapse in enrollment at Oregon Tech;
3. Be currently enrolled at Oregon Tech;
4. Have completed a minimum of 30 graded credits at Oregon Tech with minimum cumulative GPA of 3.0 or better since resuming studies at Oregon Tech;
5. Apply for forgiveness with the Academic Progress and Petitions Committee before degree completion.

## Procedure

To apply for academic forgiveness, a student must submit a formal letter of request to the University Registrar, which must include:

1. Specific term(s) (maximum of three consecutive) for which forgiveness is being requested;
2. Statement of academic goals and a term-by-term plan for degree completion signed by the student's academic advisor;
3. Rationale for the request.

The University Registrar will forward the application to the Academic Progress and Petitions Committee for review and will notify the student of the Committee's decision.

## Veterans Satisfactory Progress Standards

The Veterans Certifying Official administers the satisfactory-progress standards for students who are receiving educational benefits. The following satisfactory progress requirements apply:

1. Students must make satisfactory progress toward their certified educational objectives. They must satisfactorily complete all courses for which they have been certified.
2. Students who reduce their course load at any time during the term must notify the Veterans Certifying Official of this reduction. Withdrawals from courses after the drop period may result in an overpayment of benefits unless there are mitigating circumstances.
3. Students must maintain a term GPA of 2.0 or better. A term GPA of less than 2.0 constitutes unsatisfactory progress.
4. The Veterans Administration will be notified by Oregon Tech within 30 days of any change in status or failure to meet satisfactory progress.
5. Students will be placed on probation at the end of the first term of unsatisfactory progress. The length of the probationary status is one term. Failure to meet satisfactory progress at the end of the probationary term could result in termination of benefits.

# Graduation

## Application for Graduation

Students must file an *Application to Graduate* at least two terms prior to the term of graduation. These forms are available online at [www.oit.edu/registrar](http://www.oit.edu/registrar), at the Registrar's Office, in the Wilsonville Programs offices and in academic departments. They are submitted to the Registrar's Office for evaluation.

Oregon Tech Wilsonville students must schedule a graduation degree-check appointment with their major's program director at least two terms prior to graduation. The final graduation check is completed by the Registrar's Office at the Klamath Falls campus.

## Sealing of a Degree

All grade changes, removals of incompletes, and transfer work necessary for completion of degree requirements must be on file in the Office of the Registrar by the Friday following the end of the term of graduation. Academic records are sealed ninety days after the conferral of a degree: no changes to the record will be made following that date.

## Grade Point Requirement

Oregon Tech requires a minimum cumulative GPA of 2.0 for graduation.

## Graduation Residency Requirements

All degrees require students to take a minimum number of Oregon Tech courses. For an associate degree, a minimum of 30 term-credit hours must be taken from Oregon Tech. For a bachelor's, a minimum of 45 term-credit hours must be taken from Oregon Tech. Credits earned through Oregon Tech course challenge or the Oregon Tech Credit-for-Prior-Learning program are considered resident credits toward graduation requirements. All other credits granted by examination (CLEP or AP) or other methods are non-resident credits. Students desiring to complete course requirements for graduation from Oregon Tech at another college or university must receive prior approval from the Registrar's Office.

## Catalog of Graduation

Students must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled or from any

subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is no more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum can no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override the catalog of graduation.

## Baccalaureate Upper-Division Credit Requirement

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

## Multiple Majors

An undergraduate student may earn multiple majors if all the degree requirements for each major are met. All successfully completed majors will be listed on both the transcript and diploma.

## Concurrent Degrees

Students may be granted a second bachelor's degree provided they meet the requirements for both degrees and complete an additional 36 credits beyond the requirements of the first degree. 45 credits are required if the first degree was not granted by Oregon Tech and students must meet the general-education requirements as outlined in their catalog of graduation. If the first bachelor's degree was granted by Oregon Tech, the general education requirements are waived for the second degree.

## Curricular Requirements

Curricular requirements are determined by, and vary with, the departments involved. Major requirements are published in this catalog.

## Minors

A minor consists of a minimum of 18 credits in a subject field outside the student's major. The total credits required for a minor depend on the academic discipline, the prerequisites of the required courses and the student's starting level in the discipline. Requirements for approved minors are listed by department in this catalog. Minors will only be granted at the time students receive their baccalaureate degrees. Application for a minor must be submitted to the University Registrar with the student's petition to graduate.

## Course Substitutions

Students may seek course substitution approval by completing the *Course Substitution form* and obtaining the signature of the advisor, department chair and University Registrar. Course substitutions for general-education requirements must satisfy the same category of general education requirement. For example, a humanities course specified by the major department may be substituted for another humanities course, subject to the above approvals.

## Graduation in Absentia

Students wishing to complete the Oregon Tech degree by attending another college and transferring work after the minimum residency credits have been met (30 for associate and 45 for bachelor's degree) must complete a *Petition to Graduate* and have the final transferring classes approved for their degree by the transcript evaluator in the Oregon Tech Registrar's Office. This should be done prior to leaving Oregon Tech and beginning at the other college.

## Commencement

Oregon Tech's graduation ceremony is held in June each year at which time degrees are granted to all who have satisfactorily completed all major and university general education requirements during the preceding spring term. Summer, Fall and Winter term graduates who have already received diplomas may also participate in Commencement.

Students who demonstrate the ability to graduate in the following summer term may also participate in Commencement ceremonies. However, summer graduates will not receive academic honors or diplomas at the spring commencement.

## Diplomas

Oregon Tech awards diplomas at Commencement based on preliminary grades and preliminary degree checks for Spring-Term graduates. Students who receive a diploma at Commencement, but do not subsequently complete degree requirements, will be notified after the final degree check. The student will be asked to return the diploma. The university will place a hold on the student's registration privileges and transcript if the diploma is not returned.

Those students with estimated failing or incomplete grades will receive a letter, rather than a diploma, inside the diploma cover. After completion of all degree requirements, these students will receive their diplomas in the mail. Diplomas will also be held until all fees and charges due Oregon Tech have been paid and exit interviews have been completed for Federal, Perkins and institutional loans.

## Academic Honors

At each Commencement, Oregon Tech recognizes academically outstanding students who will receive their bachelor's degree with academic honors. This honor is based on all Oregon Tech courses. *To be eligible for honors a student must complete a minimum of 75 Oregon Tech GPA hours/credits.*

Academic honors are based on the following criteria:

### Cum Laude

Graduation with honors  
3.50-3.74 GPA

### Magna Cum Laude

Graduation with high honors  
3.75-3.89 GPA

### Summa Cum Laude

Graduation with highest honors  
3.90-4.00 GPA.

*Note: Students who do not have 75 Oregon Tech credits and who are graduating from a Degree Completion program must complete a minimum of 45 graded Oregon Tech credits to be eligible for honors. For Degree Completion students, who fall into this category, honors are based on all Oregon Tech courses and transfer courses used for the degree.*

Honors recognized at the graduation ceremony do not include grades from the term immediately preceding Commencement. After final grades are posted, the honors standing of some students may change. These students will be notified. A student's final honors standing will be posted on the official transcript.

## Honors

### Special Recognition

Each spring a number of Oregon Tech graduates will be selected for membership in national honor societies. Honor society members can be identified by a distinctive honor cord worn over the shoulder at Commencement.

Alpha Chi, which selects members from baccalaureate programs, identifies its honor society graduates with a white cord. Tau Alpha Pi, which selects members from the sophomore, junior and senior classes of engineering-technology majors, identifies its graduates with a crimson cord. Lambda Phi Eta selects from juniors and seniors in Communication Studies. Members are identified by a gold cord. Lambda Nu selects from juniors and seniors in Medical Imaging. Members are identified by a cord that is green, gold and maroon. Sigma Theta Tau, who wear gold and maroon cords, includes Nursing students in the top third of the class.

# Baccalaureate General Education Requirements

## General Education Requirements

Oregon Tech's General Education requirements provide breadth and depth to the Oregon Tech educational experience. The requirements are designed to help students widen perspectives, explore relationships between subjects and develop critical and analytical thinking skills in areas integrated with a student's major. General education provides the core of an undergraduate university education. These courses help students make progress toward becoming educated persons and provide a foundation for lifelong learning.

Through general education at Oregon Tech, students study broad topics, principles, theories and disciplines. The courses are organized within the curriculum in such a manner that

students will acquire knowledge, abilities and appreciation as integrated elements of the educational experience. In addition, general education courses teach students to communicate clearly, think critically and globally, define and solve problems within and across disciplines, calculate logically and apply scientific reasoning. No matter what their major, students will benefit from studying areas of knowledge that help them become competent, well-rounded professionals as well as well-educated human beings and citizens.

The General Education Advisory Council and Oregon Tech's faculty review the general education curriculum regularly. Oregon Tech's goal for General Education is to help students become literate, informed, critical participants in a diverse and rapidly changing global society.

All students must complete the university general education requirements as listed in the curriculum map for the major and in this catalog. If a student holds a baccalaureate degree or higher from a recognized, accredited institution, as determined by Oregon Tech, the Oregon Tech general education requirements for the Oregon Tech baccalaureate may be waived subject to departmental program requirements.

Transfer students entering Oregon Tech who have earned either an Associate of Arts Oregon Transfer degree (AAOT) or an Associate of Science in Business degree (ASOTB) from an Oregon community college will be considered as having met Oregon Tech's lower-division general education requirements.

## Communication

SPE 111 Public Speaking  
 WRI 121 English Composition  
 WRI 122 English Composition  
 Plus 9 credits from the following list: COM 205, COM 225, COM 320, COM 347, COM 401, COM 402, SPE 321, WRI 123, WRI 214, WRI 227, WRI 321, WRI 322, WRI 323, WRI 327, WRI 328, WRI 350, WRI 410.

## Humanities

9 credits selected by student or specified by a major department from the following: ART—Art; ENG—Literature; HUM—Humanities; MUS—Music; PHIL—Philosophy; Languages (second year). Other transfer courses, defined as “humanities” by the Registrar’s Office, may be used in this category. No more than three credits of activity or performance-based courses may be used in this category.

## Social Science

12 credits selected by student or specified by major department from the following: ANTH – Anthropology; ECO – Economics; GEOG – Geography; HIST – History; PSCI Political Science; PSY – Psychology; SOC Sociology. Other transfer courses, defined as “social science” by the Registrar’s Office, may be used in this category.

- \* ANTH 101 may not be used to satisfy both Social Science and Science credits.
- \* GEOG 105 and GEOG 115 may not be used to satisfy Social Science credits.

## Technology

Specific requirements for demonstrating computer proficiency may be established by the academic department.

## Science/Mathematics

One, four credit college-level mathematics course for which at least intermediate algebra is the course prerequisite.

Plus 12 credits selected by student or specified by major department from biological sciences (BIO, CHE), mathematics (MATH), statistics (STAT 412, 413, 415, or 431), physical sciences (PHY), physical geography (GEOG 105 or GEOG 115) geology (GEOL) or physical anthropology (ANTH 101). Other transfer courses, defined as “Science/Mathematics” by the Registrar’s Office, may be used in this category. At least four

credits must be completed from a laboratory-based science course in BIO, CHE, GEOG, GEOL or PHY.

## Baccalaureate Upper-Division Requirement

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor’s-degree-granting institution.

## Bachelor of Science Degree

The Bachelor of Science degree requires the student to opt between completion of 36 credits in mathematics and science or 45 credits in mathematics, science and social science. Students placed at a higher beginning level of mathematics than is published in the curriculum of their major may choose to substitute those mathematics credits surpassed by their accelerated level of placement with electives from any department to attain the required number of general education credits required by the university for graduation.

## Intercultural Studies

Students are encouraged to select at least one class from the following lists of intercultural courses. These courses also satisfy general education requirements.

Humanities: ENG 266 Native American Literature and Film; ENG 235 American Multicultural Literature, ENG 381 Contemporary World Literature; HUM 147, 148, 149 Introduction to the Humanities.

Social Science: ANTH 103 Introduction to Cultural Anthropology, GEOG 106 Cultural Geography I, GEOG 107 Cultural Geography II, GEOG 108 Cultural Geography III, HIST 392 Modern Asia.

## Notes

Students who graduated from high school in 1997 or after, who did not complete two years of the same foreign language in high school with grades of C- or better, must complete two terms of college-level foreign or second language in order to receive an Oregon Tech degree.

Remedial or developmental courses, including MATH 100 and WRI 115, cannot be used for graduation.



# University Departments and Programs

## Clinical Laboratory Science Department

Cara Calvo, *Department Chair and Program Director*

*Assistant Professors:* C. Calvo, T. Mundy, D. Taylor

*Associate Professor:* A. Furman

*Adjunct Faculty:* The program utilizes faculty physicians and faculty medical laboratory professionals at Oregon Health & Science University (OHSU) and community medical, research, and public health laboratories.

*Early Admission CLS Program (EACLSP) Advisors:* Cara Calvo and Deb Disko (Wilsonville), Rosalind McClure (Klamath Falls)

### Degree Offered

Bachelor of Science in Clinical Laboratory Science (joint degree between Oregon Tech and OHSU)

Oregon Tech, in partnership with OHSU, offers a course of study leading to a Bachelor of Science in Clinical Laboratory Science degree. Students take coursework that combines a rigorous competency-based science curriculum with community-sponsored clinical training. Graduates are prepared to enter the medical laboratory science profession and to pursue career opportunities in various laboratory settings including medical, research, and public health. Students who successfully complete the degree program are eligible to take the *Medical Laboratory Scientist (MLS)* national board certification examination offered by the *American Society for Clinical Pathology (ASCP)*.

### Accreditation

The Clinical Laboratory Science professional program is accredited by the *National Accrediting Agency for Clinical Laboratory Science (NAACLS)*, 5600 North River Road, Suite 720, Rosemont, Illinois 60018-5119. (773) 714-8880

### Mission Statement

The mission of the Oregon Tech • OHSU Clinical Laboratory Science Program is to educate, train, and graduate professionally competent and ethical individuals, commit-

ted to life-long learning, and who are prepared to meet current and future workplace challenges in medical laboratory science.

### Program of Study

During the first three years or *pre-professional phase* of study, students complete a minimum of 103-quarter hours that includes (a) 55-quarter hours of general education coursework, including one college-level math course, (b) 24-quarter hours of biology requisites that must include one microbiology course and one immunology course, and (c) 24-quarter hours of chemistry cognates. Additionally, to receive an Oregon Tech degree, students who graduated from high school in or after 1997 but who did not complete two years of a foreign language in high school must complete two terms of college-level second language coursework.

Through an application process students are selected to enter the fourth year of study or *the professional program*. **NOTE:** Oregon Tech EACLSP students who complete EACLSP requirements are automatically admitted to the CLS professional program. *For more information on the Early Admission CLS Program, contact the Department of CLS program office at (503) 821-1146 or EACLSP advisor Rosalind McClure on the Klamath Falls campus at (541)-885-1525.*

The CLS professional program is admission-restricted and 15 months (5 consecutive terms) long, beginning in September of the academic year in which a student is admitted and ending in December of the following year. Admitted students spend four quarters completing clinical laboratory science-specific coursework on the Oregon Tech Wilsonville campus. Upon successful completion of the on-campus work, students are assigned to one or more program-affiliated laboratories to complete an extended fifth term (16 weeks) of clinical training. During clinical training, students spend 40 hours per week applying knowledge and skills to perform a wide variety of testing in a contemporary, accredited medical laboratory and to further develop discipline-specific competency under supervision of clinical instructors. Currently, the Department of CLS maintains affilia-

tions with accredited laboratories in Oregon, Washington, and Nevada.

Students admitted to the CLS professional program are guaranteed placement for their clinical training subject to the following policies and procedures:

1. Due to the variable availability of training sites year to year and the nature of contractual agreements with affiliated training sites, student placement at a specific site may not be possible. Therefore, placement of students for clinical training is determined by the program in consultation with clinical affiliate training sites.
2. Before beginning clinical training, students must comply with all training site requirements including but not limited to passing a drug test and completing a criminal background check.
3. All academic requirements must be met before a clinical training assignment is made.
4. Students are required to provide proof of health insurance coverage valid for the entire clinical training period.
5. Students are solely responsible for transportation and housing needs associated with their clinical training placement.

### Professional Program Application and Admission Requirements

The professional program admits one cohort of students a year. Except for *EACLSP students*, all prospective students should submit completed applications from September 1<sup>st</sup> to December 31<sup>st</sup> of the preceding year for which an applicant seeks admission. Students can download application instructions and the application forms from URL <http://www.oit.edu/wilsonville/programs/clinical-laboratory-science/how-to-apply>. *Importantly, transfer and post-baccalaureate students must also submit a separate application for admission to Oregon Tech.* Prospective students may apply online at URL [https://banweb.ous.edu/oit-prd/owa/bwskalogs\\_P\\_DisplayLoginNon](https://banweb.ous.edu/oit-prd/owa/bwskalogs_P_DisplayLoginNon). When asked, applicants should select “*Pre CLS*” as

their major. Applications received by the CLS professional program office (Wilsonville) will not be considered if an Oregon Tech admissions application is not on file with the [Oregon Tech Admissions' office](#) (Klamath Falls).

**NOTE: Admission to Oregon Tech does not mean that an applicant has been admitted to the CLS professional program.**

Admission to the professional program is criterion-based, competitive, and decided by the program admissions committee. Admission selection is based upon scholarship, personal qualifications, recommendations from three references, and Interview results. Selected candidates are interviewed in February and applicants selected for admission are notified in writing by the Program Director during March. To be eligible for admission, candidates for the CLS professional program must meet the following minimum eligibility requirements:

- Those applicants who have earned a Baccalaureate degree must have completed a minimum of 103 transferable quarter credit hours to include:
  - Mathematics:** one college-level math course. Minimum requirements are met by MATH 111 College Algebra. **Additional recommended course:** statistics;
  - Biology:** 24-quarter credit hours that must include one course each of microbiology and immunology; courses must be at the 100 level or above and not survey type. **Additional highly recommended courses:** general biology, genetics, anatomy and physiology, cellular and molecular biology;
  - Chemistry:** 24-quarter credit hours of chemistry; courses must be at the 100 level or above and not survey type. **Highly recommend courses:** general chemistry, organic chemistry, biochemistry, and quantitative analysis; and
  - Either two years of high school foreign language or two terms of college-level foreign language.
- Those applicants who have not earned a Baccalaureate degree must have completed a minimum of 103 transferable

quarter hours to include the prerequisites listed in 1 above and:

- 18-quarter credit hours of Communication course work including specified course work in writing and speech (see Baccalaureate General Education Requirements described elsewhere in this catalog);
- 9-quarter credit hours of Humanities course work in topical areas such as Art, Art History or Appreciation, Music, Music History or Appreciation, English (excluding writing and speech), Linguistics, and Philosophy (no more than three credits of activity of performance-based courses may be used in this category); and
- 12-quarter credit hours of Social Science course work in topical areas such as Anthropology, Economics, Geography, History, Political Science, Psychology, and Sociology.

Prerequisite course work does not need to be completed to apply, but must be completed before an admitted student begins any professional program classes. The Oregon Tech Registrar's office will review each applicant's transcripts to confirm that the requirements are met. Applicants who have met **admission requirements** seven or more years prior to application to the CLS Program must complete additional academic work to qualify. This may be accomplished by:

- Completing a course in chemistry and biology with a grade of C or better - upper division level courses recommended; or
- Receiving credit by examination in biochemistry and in microbiology; or
- Achieving a CLEP score at or above the 50th percentile on both the biology and chemistry examinations.

Applicants seeking transfer credit from international institutions must provide a credential evaluation from an Oregon Tech-approved credential evaluation service and must meet requirements as described in two above. Contact the Oregon Tech Office of Admissions on-line at <http://www.oit.edu/wilsonville/admission> or by telephone 503.821.1250 or 1.800.422.2017 for additional information.

- All applicants must have a minimum GPA of 2.5 to apply.

Oregon Tech EACLSP Students  
Oregon Tech students with sophomore or junior year standing may apply for acceptance into the *Early Admission to Clinical Laboratory Science Program* track (EACLSP). EACLSP students who meet the following minimum eligibility requirements are automatically admitted to the CLS professional program:

- At the time of application to the EACLSP, a student must be enrolled at either the Klamath Falls or Wilsonville Oregon Tech campus with at least sophomore standing; and
- A EACLSP-track student must carry a minimum of 12-credits at Oregon Tech per term; and
- Complete all pre-professional CLS program coursework with grades of "C" or better; and
- Earn a minimum GPA of 3.00 in each term; and
- Maintain a cumulative GPA of at least 3.25 in each term; and
- Adhere to the Student Life Policies and Regulations and the Oregon Tech Academic Regulations - see the *Oregon Tech General Catalog* and *Oregon Tech Student Handbook*;
- Job-shadow a minimum of 10 hours in an approved medical laboratory setting;
- Complete CLS 100 Introduction to Clinical Laboratory Science with a grade of "B" or better; and
- Pass a criminal background check.

## Graduation Requirements

BS CLS degree students must complete 196-198 quarter credits hours, maintain a minimum GPA of 2.00, and earn a grade of "C" or better in all professional program courses (CLS) as prescribed by the curriculum outline.

# Bachelor of Science in Clinical Laboratory Science

## Curriculum

All senior level courses require admission to the Clinical Laboratory Science Program or instructor consent. Required courses and recommended terms during which they should be taken:

### Pre-Clinical Laboratory Science

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
	Intro elective*	2
<b>Total</b>		<b>13</b>

Freshman Year		Winter
BIO 200	Medical Terminology	2
BIO 232	Human Anatomy and Physiology II	4
WRI 122	Argumentative Writing	3
	Social Science elective	3
<b>Total</b>		<b>12</b>

Freshman Year		Spring
BIO 233	Human Anatomy and Physiology III	4
CLS 100	Introduction to Clinical Laboratory Science	2
SPE 111	Public Speaking	3
	Humanities elective	3
<b>Total</b>		<b>12</b>

Sophomore Year		Fall
BIO 345	Medical Microbiology	5
CHE 221	General Chemistry	5
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>13</b>

Sophomore Year		Winter
BIO 209	Current Research Topics in Medical Sciences I	1
BIO 346	Pathophysiology I	3
CHE 222	General Chemistry	5
WRI 327	Advanced Technical Writing	3
<b>Total</b>		<b>12</b>

Sophomore Year		Spring
BIO 347	Pathophysiology II	3
CHE 223	General Chemistry	5
MATH 361	Statistical Methods I	4
<b>Total</b>		<b>12</b>

Junior Year		Fall
CHE 331	Organic Chemistry I	4
SPE 321	Small Group and Team Communication	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>13</b>

Junior Year		Winter
BIO 341	Medical Genetics	3
CHE 332	Organic Chemistry II	4
PHIL 331	Ethics in the Professions	3
	Social Science elective	3
<b>Total</b>		<b>13</b>

Junior Year		Spring
BIO 436	Immunology	4
CHE 333**	Organic Chemistry III	5
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>15</b>

\* Freshman fall Intro elective – choose one of the following:

ACAD 105	Achieving Academic Success
HED 240	Emergency Care & CPR
HED 246	Drugs and Alcohol Problems of Modern Society
HED 250	Contemporary Health Issues
HED 260	Diet and Exercise for Lifetime Fitness

### Professional Courses

Senior Year		Fall
CLS 420	Clinical Immunology	4
CLS 432	Foundations of CLS I	4
CLS 424	Hemostasis	3
CLS 444	Microbiology I	6
<b>Total</b>		<b>17</b>

Senior Year		Winter
CLS 415	Clinical Chemistry I	6
CLS 447	Practicum: Chemistry	6
CLS 445	Clinical Microbiology II	4
CLS 449	Practicum: Urinalysis	2
<b>Total</b>		<b>18</b>

Senior Year		Spring
CLS 412	Pathophysiology	2
CLS 416	Clinical Chemistry II	2
CLS 442	Hematology I	6
CLS 443	Immunohematology I	4
CLS 446	Microbiology III	4
<b>Total</b>		<b>18</b>

Senior Year		Summer
CLS 422	Molecular Methods	2
CLS 448	Infectious Serology	1
CLS 452	Hematology II	5
CLS 453	Immunohematology II	2
CLS 457	Practicum: Advanced Chemistry/Immunology Techniques	2
CLS 462	Foundations of CLS II	2
<b>Total</b>		<b>14</b>

Senior Year		Fall
CLS 470	Clinical Laboratory Externship	4
CLS 471	Hematology Externship	4
CLS 472	Microbiology Externship	4
CLS 473	Immunohematology Externship	4
<b>Total</b>		<b>16</b>

\*\*CHE 103+106 (Elementary Biochemistry) 4 credits or CHE 360 Clinical Pharmacology 3 credits may be substituted.

*Total Credits Required for B.S. Clinical Laboratory Science: 196-198*



# Emergency Medical Services Department

Jamie Kennel, *Department Chair*

Todd Ellingson, *Medical Director*

*Assistant Professor:* J. Kennel

*Instructors:* K. Darling, C. Hamper, S. Schmidt, A. Wagner

## Degree Offered

Associate of Applied Science (AAS) in Paramedicine (joint degree through Oregon Tech and OHSU).

Bachelors of Science (BS) of Emergency Medical Services Management (joint degree through Oregon Tech and OHSU).

## Career Opportunities

Job opportunities are available for certified Emergency Medical Technicians (EMT) and Paramedics in a variety of settings including ambulance transport agencies, fire and rescue agencies, air-medical transport agencies, medical support for industrial sites, tactical-medical teams, hospitals, and international aid missions, to name just a few.

The Paramedic Education Program (PEP) was established in 1977 at Oregon Health & Science University. The PEP was transferred to the Oregon Institute of Technology in 2001 and remains a collaborative joint degree program with OHSU. Academic classes utilize facilities at both the Oregon Tech Wilsonville campus and the OHSU Marquam Hill campus.

The EMT and Paramedic program prepares students for an entry position in the pre-hospital medicine profession. Upon successful completion of the program, graduates are eligible to sit for the National Registry examination, which can lead to both national and state certifications.

## Accreditation

The Paramedic Education Program is nationally accredited by The Commission on Accreditation of Allied Health Education Programs ([www.caahep.org](http://www.caahep.org)) upon the recommendation of the Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions (CoAEMSP).

## Admission Requirements

Any student who meets the general Oregon Tech admissions requirements may enroll in Pre-Paramedic courses (freshman year). A limited number of seats are available in the Paramedic Program (sophomore year) and are eligible to both transfer and internal Oregon Tech students. Students are selected to enter the professional program through a competitive application process (see [www.oit.edu/paramedic](http://www.oit.edu/paramedic) for the latest application information).

Students preparing for the application process, for either the EMT or Paramedic program, are encouraged to focus their experience and performance in the following general areas:

1. Successful academic performance overall with an emphasis on science coursework performance
2. Experience in providing pre-hospital care (volunteer, intern, BLS transports, etc)
3. Customer service experience

## Curriculum

The following are required courses and recommended terms for students wishing to meet the AAS degree requirements. All courses listed on the curriculum map in the catalogue year a student begins a program must be fulfilled for graduation eligibility.

# Associate of Applied Science in Emergency Medical Technology- Paramedicine

## Curriculum

Required courses and recommended terms during which they should be taken:

### Pre-Paramedic Courses

<u>Freshman Year</u>		<u>Fall</u>
EMS 200	Medical Terminology	3
BIO 231	Human Anatomy and Physiology I	4
HED 260	Diet & Exercise for Lifetime Fitness	2
MATH 100	Intermediate Algebra	4
WRI 121	English Composition	3
<b>Total</b>		<b>16</b>

<u>Freshman Year</u>		<u>Winter</u>
BIO 232	Human Anatomy and Physiology II	4
EMS 151	Emergency Medical Technician I	5
SPE 111	Public Speaking	3
	Social Science Elective	3
<b>Total</b>		<b>15</b>

<u>Freshman Year</u>		<u>Spring</u>
BIO 233	Human Anatomy and Physiology III	4
EMS 115	Introduction to EMS	3
EMS 152	Emergency Medical Technician II	5
<b>Total</b>		<b>12</b>

### Paramedic Professional Courses

<u>Sophomore Year</u>		<u>Fall</u>
CHE 210	Clinical Pharmacology	3
EMS 218	Trauma Emergencies	3
EMS 231	Medical Emergencies I	4
EMS 235	Basic Electrocardiography	2
EMS 241	Paramedic CRM I	4
EMS 271	EMT-Paramedic Skills Laboratory Part I	3
<b>Total</b>		<b>19</b>

<u>Sophomore Year</u>		<u>Winter</u>
EMS 211	Prehospital Emergency Pharmacology	3
EMS 232	Medical Emergencies II	3
EMS 236	Advanced Electrocardiography	2
EMS 242	Paramedic CRM II	1
EMS 272	EMT-Paramedic Skills Laboratory Part I	2
EMS 283	<b>Group 1**</b> Clinical Practicum I	6
EMS 283	<b>Group 2**</b> Clinical Practicum II	6
<b>Total</b>		<b>17</b>

<u>Sophomore Year</u>		<u>Spring</u>
EMS 233	Medical Emergencies III	3
EMS 243	Paramedic CRM III	1
EMS 273	EMT-Paramedic Skills Laboratory Part I	2
EMS 283	<b>Group 1**</b> Clinical Practicum I	6
EMS 284	<b>Group 2**</b> Clinical Practicum II	6
EMS 291	Field Externship I	5
<b>Total</b>		<b>17</b>

<u>Sophomore Year</u>		<u>Summer</u>
EMS 292	Field Externship Practicum II 1	2
<b>Total</b>		<b>12</b>

\*\*The class is divided into two groups. Students will be assigned to a group for clinical practicum rotations.

Total Credit Hours for A.A.S. Degree in  
EMT-Paramedic:

Technical Credits Total	64
<b><i>Degree Credits Total</i></b>	<b>107</b>

# Civil Engineering

Sean St.Clair, *Department Chair*

Roger Lindgren, *Program Director, Master of Science in Civil Engineering*

David Thaumert, *Curriculum Coordinator*

*Professors:* R. Lindgren

*Associate Professors:* S. St.Clair

*Assistant Professors:* C. Riley, M. Sleep, D. Thaumert

Civil engineers design infrastructure—transportation networks, bridges, buildings, dams, communities, and water and waste management systems—for the enhancement of human welfare and protection of our environment. Oregon Tech's freshman-to-master's Civil Engineering degree program, the first such program in the Pacific Northwest, equips students to meet industry needs identified by the American Society of Civil Engineers (ASCE). This unique pairing of degrees prepares future professionals for licensure requirements proposed in the National Council of Examiners for Engineering and Surveying (NCEES) Model Law.

## Career Opportunities

Upon completing the core curriculum, civil engineering students have a solid foundation in structural, transportation, water resources/environmental and geotechnical engineering. In their fourth and fifth years of study, students can then target specific careers within the broad field of civil engineering. Graduates have career opportunities with consulting firms, government agencies, heavy construction and industry.

Geotechnical engineering involves the design and construction of projects built on and of the earth. These projects include foundations for structures, earth embankments of soil and rock, dams, levees, and tunnels. In addition geotechnical engineers predict reactions of the earth due to changes imposed by other engineered systems.

Structural engineering involves the planning, analysis and design of buildings and other structures using the principal construction materials of wood, steel, concrete and masonry. Graduates are familiar with current codes and standards, and are aware of trends in high-performance structures.

Transportation engineering is concerned with

the planning, design, construction, operation, performance, evaluation and rehabilitation of transportation systems and facilities, such as streets, highways, railroads, mass transit, and air transportation systems.

Water resources and environmental engineering address the spectrum of water from supply to transport to use to discharge, and is at the junction of efforts to provide sustainable human and natural environments, in compliance with regulatory mandates. Graduates have opportunities in planning, design, and operation of hydraulic and water resource projects, floodplain management, or resource management issues.

Civil engineering graduates may consider a concurrent degree in environmental sciences to expand career opportunities with a broad spectrum of government agencies, consulting firms, and industry.

## Degrees Offered

Bachelor of Science & Master of Science in Civil Engineering (co-terminal)  
Master of Science in Civil Engineering  
Bachelor of Science in Civil Engineering

## Mission Statement

The mission of the Oregon Tech Civil Engineering program is to prepare students for professional practice. To be prepared to practice as professionals, engineers must be able to act responsibly and ethically, understand their limits and the limits of the tools they use, communicate effectively, work well in teams, and, amid the changing landscape of the field of civil engineering, be able to pursue graduate-level education.

## Objectives

Civil engineering graduates will be able to:

1. Practice as a professional civil engineer.
2. Pursue advanced education in civil engineering or related fields.
3. Act as responsible, effective and ethical citizens.
4. Understand and effectively communicate the realistic constraints of civil engineering.
5. Perform effectively in a multi-disciplinary environment.

Students enjoy a close relationship with full-time faculty with advanced engineering degrees who are also licensed professionals with many years of practical experience. Course offerings promote education in theory relevant to our civil engineering technical areas, engineering design and principles of sustainable development. These concepts are emphasized and integrated throughout the curriculum in a sequential manner.

Early in the curriculum, elements of the creative design process are introduced as students complete first-year design projects. While most freshman and sophomore courses are intended to provide a solid background in mathematics, communications, basic sciences, and engineering mechanics, certain courses provide additional concepts and methodologies supporting more advanced topics in engineering and professional practice.

At the junior level, students develop a broad civil engineering base. Junior courses include core topics in structural, transportation, water resources and geotechnical engineering.

In the fourth year, students are required to complete an intensive engineering design project. This effort is focused on a professional-quality civil engineering design and includes essential elements of technical communications and group dynamics. The senior project also involves realistic constraints including cost and sustainability considerations, socioeconomic effects, aesthetic choices and ethical deliberations. In this year, students also begin their selected program of graduate-level coursework leading to selection of their graduate project.

Finally, students complete coursework and individual graduate projects leading to the co-terminal bachelor's and master's degrees. Students also prepare for the Fundamentals of Engineering (FE) examination as a first step toward licensure as professional engineers.

To ensure graduates can become responsible, effective citizens and begin building a foundation for lifelong learning, students are required to satisfy Oregon Tech general education requirements in communication, humanities, social sciences, and science/mathematics.

## Student Preparation

Students interested in the field of civil engineering should emphasize mathematics and science in high school. Two years of algebra and one year each of geometry, trigonometry, chemistry and physics are preferred. Additional courses in mathematics and computer-aided drafting are desirable.

## Accreditation

The Civil Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Graduation Requirements

All courses listed in the curriculum for the current catalog year must be completed to be eligible for graduation, unless a student has already completed the requirements for a category that has changed. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

For the co-terminal bachelor's and master's degrees in Civil Engineering, a minimum of 225 credits must be completed. Students must maintain a 3.0 GPA for progression to the fourth and fifth years of study. In addition, a final grade of "C" or better must be earned in all courses with CE or CIV, ENGR, GME, MATH, CHE, and PHY prefixes, as well as all courses listed as prerequisites for these courses. At least 45 credits of graduate work must be completed.

For the bachelor's degree in Civil Engineering, a minimum of 180 credits must be completed and students must maintain a 2.0 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all courses with CE or CIV, ENGR, GME, MATH, CHE, and PHY prefixes as well as all listed prerequisites for these courses.

The Master of Science in Civil Engineering requires completing 45 credits of graduate work.

## Concurrent Degree in Environmental Sciences

Civil Engineering students have the opportunity to earn concurrent degrees in Civil Engineering and Environmental Sciences. The additional degree requires 45 credits in Environmental Sciences courses, which can be taken concurrent to Civil Engineering courses or as an add-on year. The dual degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Civil Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Civil Engineering.

BIO 111	Introduction to Environmental Sciences	4
BIO 211	Principles of Biology	4
BIO 212	Principles of Biology	4
BIO 213	Principles of Biology	4
BIO 225	Riparian Assessment Methods	1
BIO 327	General Ecology	
	or	
BIO 337	Aquatic Ecology	4
BIO 434	Data Analysis Methods	
	or	
MATH 362	Statistical Methods II	4
BIO 484	Sustainable Human Ecology	4
CHE 223	General Chemistry*	5
CHE 235	Stream water Chemistry and Sampling	3
CHE 331	Organic Chemistry I	4
ENV 314	Environmental Management and Restoration	3
GEOG 105	Physical Geography *	3
GME 134	Geographic Information Systems Chemistry Technical Emphasis Elective**	3

\* CHE 223 and GEOG 105 should be taken as Civil Engineering Math/Science electives.

\*\* This technical emphasis elective must have a CHE prefix; different courses are offered every year.

Total Additional Credits Needed: 53

## Bachelor of Science/Master of Science in Civil Engineering Curriculum

Required courses and recommended terms during which they should be taken:

### Freshman Year Fall

CHE 221	General Chemistry	5
ENGR 101	Introduction to Engineering I	2
WRI 121	English Composition	3
SPE 111	Fundamentals of Speech	3
	Humanities elective*	3
<b>Subtotal</b>		<b>16</b>

### Freshman Year Winter

CHE 222	General Chemistry	5
ENGR 102	Introduction to Engineering II	2
WRI 122	English Composition	3
	Humanities elective*	3
	Social Science elective	3
<b>Subtotal</b>		<b>16</b>

### Freshman Year Spring

CE 203	Engineering Graphics	3
MATH 251	Differential Calculus	4
	Humanities elective*	3
GEOL 201	Physical Geology	4
<b>Subtotal</b>		<b>14</b>
<b>Year total</b>		<b>46</b>

### Sophomore Year Fall

CE 212	Civil Engineering Materials	4
GME 161	Plane Surveying I	4
MATH 252	Integral Calculus	4
PHY 221	General Physics with Calculus	4
<b>Subtotal</b>		<b>16</b>

### Sophomore Year Winter

ENGR 211	Engineering Mechanics: Statics	4
CE 205	Computational Methods	2
MATH 254N	Vector Calculus I	4
PHY 222	General Physics with Calculus	4
<b>Subtotal</b>		<b>14</b>

### Sophomore Year Spring

GME 134	Geographic Information Systems	3
CE 208	Principles of Professional Practice	4
ENGR 213	Engineering Mechanics: Strength of Materials	4
WRI 227	Technical Writing	3
<b>Subtotal</b>		<b>14</b>
<b>Year total</b>		<b>44</b>

### Junior Year Fall

CE 311	Introduction to Geotechnical Engineering	5
CE 331	Structural Analysis	4
ENGR 318	Engineering Mechanics: Fluids	4
MATH 361	Statistical Methods I	4
<b>Subtotal</b>		<b>17</b>

## Bachelor of Science in Civil Engineering Curriculum

For students who choose not to complete the co-terminal degree program, the fourth year of the curriculum is modified to the following BSCE-only degree.

### Junior Year Winter

ANTH 335	The Built Environment	
or		
HIST 335	The Engineering Profession	
CE 341	Elementary Structural Design	5
CE 351	Introduction to Transportation Engineering	4
CE 371	Closed Conduit Design	4
<b>Subtotal</b>		<b>16</b>

### Junior Year Spring

CE 312	Earth Pressures & Foundations	3
CE 354	Traffic Engineering	3
CE 374	Hydrology	4
MATH 321	Applied Differential Equations I	4
<b>Subtotal</b>		<b>14</b>
<b>Year total</b>		<b>47</b>

### Fourth Year

CE 401/COM 401	Civil Engineering Project I	5
CE 402/COM 402	Civil Engineering Project II	7
CE 405	Sustainability & Infrastructure	3
CE 442,	Advanced Reinforced Concrete Design	
or		
CE 444	Intermediate Steel Design	
	Technical electives**	3
	Technical electives >500**	9
CE 501	Graduate Seminar	1
WRI 521	Writing at the Graduate Level	3
MATH 4__	Math/Science elective	3
	Social Science elective	3
<b>Year total</b>		<b>41</b>

### Fifth Year

ANTH 452	Globalization	3
CE 591	Graduate Project	3-9
	Technical electives**	15
	Technical electives >500**	14-20
<b>Year total</b>		<b>47</b>
<b>Degrees total</b>		<b>225</b>

\* Humanities courses may not be skill- or performance-based.

\*\* Technical electives are generally 400- and 500-level CE courses. A maximum of 9 non-CE technical elective credits (specified below) may be applied to the co-terminal BSCE/MSCE degree.

### Required courses for BSCE completion:

#### Senior Year

CE 401/COM 401	Civil Engineering Project I	5
CE 402/COM 402	Civil Engineering Project II	7
CE 405	Sustainability & Infrastructure	3
CE 442	Advanced Reinforced Concrete Design	
or		
CE 444	Intermediate Steel Design	
	Technical electives***	15
ANTH 452	Globalization	3
	Math/Science elective	3
	Social Science elective	3
<b>Year total</b>		<b>43</b>
<b>Degree total</b>		<b>180</b>

\*\*\* Technical electives are generally 400- and 500-level CE courses. A maximum of 8 non-CE technical elective credits may be applied to the BSCE degree.

### Allowed Non-CE Technical Electives

ENV 435	Atmospheric Physics	4
GME 351	Construction and Engineering Surveying	
or		
GME 372	Subdivision Planning and Platting	
GME 425	Remote Sensing	4
MATH 341	Linear Algebra I	3
MATH 425	Vector Analysis	3
MATH 451	Numerical Methods I	4
MATH 465	Mathematical Statistics	4

# Communication Department

Kevin Brown, *Department Chair*

*Professors:* M. Dyrud, L. Young

*Associate Professors:* K. Brown, J. Murray,  
D. Peterson, J. Puckett, M. Schnack-  
enberg

*Assistant Professors:* V. Ball, J. Knight, M.  
Search

*Instructors:* J. Calvo, R. Schwartz

## Degree Offered

Bachelor of Science in Communication  
Studies

The Bachelor of Science in Communication Studies allow students flexibility in designing a program that fits their life and career goals. Students choose core courses and electives from areas such as technical, organizational, and interpersonal communication. In addition, students build a career foundation by completing a *focused sequence of electives*.

## Minors Offered

Human Communication  
Technical Communication

## Certificate Offered

Dispute Resolution

## Career Opportunities

The Communication Studies Program prepares students for careers in areas such as technical communication, organizational

communication, new communication technologies, education, human resources, project management, public relations, sales, and mediation.

## General Education Courses

To ensure that Oregon Tech's graduates are skilled communicators, the Communication Department provides writing, speech, and communication courses to satisfy general education requirements. Students in other majors should consult the general education and degree requirements in their major departments.

## Student Preparation

All students who plan to study at Oregon Tech should enroll in writing and speech classes during their high school years to better benefit from the university's communication courses. Students applying to the Communication Studies Program should have especially strong reading and writing skills. It is important to have a well-rounded college preparation background, including courses in math, sciences, and general education.

## Degree Requirements

The Bachelor of Science in Communication Studies requires 184 credits. All major courses, general education communication courses, and focused sequence of electives courses must be completed with a grade of "C" or higher.

## Bachelor of Science in Communication Studies

### Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
COM 104	Introduction to Communication	3
COM 115	Introduction to Mass Communication	3
COM 225	Interpersonal Communication	3
PSY 201	Psychology	3
WRI 121	English Composition	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
COM 105	Introduction to Communication Theory	3
HUM 125	Introduction to Technology, Society and Values	3
PSY 202	Psychology	3
WRI 122	Argumentative Writing Social Science elective	3
<b>Total</b>		<b>15</b>

Freshman Year		Spring
COM 106	Introduction to Communication Research	3
MATH 105	Collegiate Mathematics or MATH 111 College Algebra or MATH 243 Introductory Statistics	4
PSY 203	Psychology	3
SPE 111	Public Speaking Elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Fall
JOUR 211	Publications—Student Newspaper	3
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing Laboratory Science elective Elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Winter
COM 276	Democracy and Media Focused Sequence elective* Focused Sequence elective* Laboratory Science/Math elective Elective	3
<b>Total</b>		<b>16</b>

**Sophomore Year** **Spring**

COM 205	Intercultural Communication	3
COM 237	Introduction to Visual Communication	3
COM 255	Communication Ethics	3
	Focused Sequence elective*	3
	Laboratory Science/Math elective	4
<b>Total</b>		<b>16</b>

**Junior Year** **Fall**

COM 326	Communication Research	3
ECO 202	Principles of Economics, Macroeconomics	3
	Focused Sequence elective*	3
	Focused Sequence elective*	3
	Major elective**	3
<b>Total</b>		<b>15</b>

**Junior Year** **Winter**

COM 345	Organizational Communication I	3
COM 301	Rhetorical Theory and Application	3
	Focused Sequence elective*	3
	Major elective**	3
	Major elective**	3
<b>Total</b>		<b>15</b>

**Junior Year** **Spring**

	Focused Sequence elective*	3
	Humanities elective	3
	Major elective**	3
	Major elective**	3
	Major elective (upper-division)**	3
<b>Total</b>		<b>15</b>

**Senior Year** **Fall**

COM 421	Senior Project I***	3
	Focused Sequence elective****	3
	Elective (upper-division)	3
	Elective (upper-division)	3
	Elective	3
<b>Total</b>		<b>15</b>

**Senior Year** **Winter**

COM 422	Senior Project II***	3
	Business elective	3
	Focused Sequence elective (upper-division)*	3
	Social Science elective (upper-division)	3
	Elective (upper-division)	3
<b>Total</b>		<b>15</b>

**Senior Year** **Spring**

COM 423	Senior Project III***	3
	Focused Sequence elective (upper-division)*	3
	Social Science elective (upper-division)	3
	Social Science elective (upper-division)	3
	Elective	3
	or	
COM 420	Externship***	15
<b>Total</b>		<b>15</b>

\* Chosen by students from a list of *focused sequence of electives* and developed in consultation with their advisors. The focused sequence totals 30 units of the student's choice; three credits must be upper-division.

\*\* Chosen by students from a list of Communication, Organizational Communication, and Technical Communication electives (six credits required of each; *minimum of 4 credits upper-division*; minimum one upper-division writing course which meets general education Communication requirements.)

\*\*\* During the senior year, students will complete a capstone project, either a senior project or externship, in which they apply and integrate the skills gained in their courses. The senior project will be completed under the supervision of a faculty advisor and will span the academic year. Externships will be concentrated in one or more terms and will require supervision of a faculty advisor.

\*\*\*\* For senior project students, this focused sequence elective must be upper-division.

**Curriculum notes:** To earn the Bachelor of Science degree, students must complete 36 credits in mathematics and science or 45 credits in mathematics, science, and social science. Students must also complete 60 credits of upper-division courses.

There is no guarantee of externships for Communication Studies majors. The best externship experiences are often those identified and arranged by students.

**Total Required Credits for B.S. Communication Studies: 184**

**Major Elective Courses**

Students will select electives from three categories—Communication, Organizational Communication and Technical Communication—and include two courses (6 credits) from each category, for a total of 18 required credits. A minimum of 12 credits must be upper-division. Please note that some electives require prerequisites.

**Communication (6 credits)**

COM 215	Creativity in Communication
COM 216	Essentials of Grammar and Punctuation
COM 226	Nonverbal Communication
COM 248	Digital Media Production
COM 320	Advanced Intercultural Communication
COM 358	Communication and the Law
COM 425	Mediation
COM 426	Mediation Practicum
JOUR 311	Advanced Publications—Student Newspaper
SPE 314	Argumentation
WRI 123	Research Writing
WRI 305	Writing for the Marketplace
WRI 328	Technical Journalism

**Organizational Communication (6 credits)**

COM 256	Public Relations
COM 347	Negotiation and Conflict Resolution
COM 348	Facilitation
COM 437	Communication Training and Development
COM 445	Organizational Communication II
COM 446	Communication and Leadership

**Technical Communication (6 credits)**

COM 365	Electronic Communication and Society
WRI 214	Business Correspondence
WRI 327	Advanced Technical Writing
WRI 350	Documentation Development
WRI 410	Proposal and Grant Writing
WRI 415	Technical Editing
WRI 420	Document Design

**Human Communication Minor**

The Human Communication Minor supplements Oregon Tech technical and applied science degrees and provides advanced training in communication skills. The minor offers courses in the analysis and practice of human communication in a variety of areas including interpersonal, intercultural, health, nonverbal and electronic communication. In addition, the minor allows students to practice conflict resolution, negotiation strategies, ethical communication and rhetorical analysis. Students who have performed well in general education communication courses are encouraged to enroll in this minor. For further information on enrollment, contact a member of the Communication Department or the Communication Department chair. One goal of the Human Communication Minor is to educate students from a variety of majors in the effective practice of human communication skills based on theoretical understandings of communication.

**Career Opportunities**

The Human Communication minor enhances students' employability and career flexibility. Many employers in many industries seek employees who can work effectively on multi-disciplinary teams, communicate in many (including international) contexts, understand and resolve conflict in the workplace and analyze and create effective messages in a variety of settings.

**Requirements of the Human Communication Minor**

SPE 321	Small Group and Team Communication
COM 205	Intercultural Communication
COM 225	Interpersonal Communication

In addition, students will select THREE from the following list of courses:

- COM 226 Nonverbal Communication
- COM 301 Rhetorical Theory and Application
- COM 320 Advanced Intercultural Communication
- PHIL 331 Ethics in the Professions
- COM 346 Health Communication
- COM 347 Negotiation and Conflict Resolution
- COM 365 Electronic Communication and Society

## Technical Communication Minor

The Technical Communication Minor supplements Oregon Tech technical degrees and provides advanced training and experience in communication skills. The minor offers specialized communication courses in such varied areas as proposal and grant writing, documentation development, and technical editing.

Students who have performed above-average work in their lower-division communication courses are encouraged to enroll in the program. For further information on enrollment, contact any Communication Department faculty member.

## Career Opportunities

The Technical Communication Minor will enhance students' flexibility as their careers develop. Employers in private industry, governmental agencies, and research facilities seek a unique combination of skills. First, employers know that the major coursework at Oregon Tech prepares students well. Second, the Technical Communication Minor courses build skills in project development, manual writing and editing, computer-aided writing and publishing, oral presentations, and interviewing skills that complement technical education. Even if students choose not to work as technical writers or editors, the Technical Communication Minor may increase job opportunities and professional advancement.

## Requirements of the Minor

In addition to the general education requirements in communication, Technical Communication Minor students take four upper-division courses (12 units). Students take two required core courses and choose two electives from the list below. Students must earn a "C" or better in all courses to complete the minor.

## Required Courses

- COM 301 Rhetorical Theory and Application
- WRI 328 Technical Journalism

## Elective Courses

- COM 365 Electronic Communication and Society
- COM 415 Developing Effective Multimedia-based Presentations
- WRI 350 Documentation Development
- WRI 410 Proposal and Grant Writing
- WRI 415 Technical Editing
- WRI 420 Document Design

## Dispute Resolution Certificate

The Dispute Resolution Certificate provides students with a thorough foundation of communication courses related to dispute resolution. The program culminates in specialized courses: negotiation, facilitation, and mediation, giving students expertise in the field. A practicum in mediation offers practical experience in community mediation and guarantees competence of students completing the certificate. This certificate provides students with both the theoretical background and the practical experience to effectively resolve conflicts in a variety of contexts.

## Prerequisite or Co-requisite Classes

- |         |                       |   |
|---------|-----------------------|---|
| SPE 111 | Public Speaking       | 3 |
| WRI 121 | English Composition   | 3 |
| WRI 122 | Argumentative Writing | 3 |

## Program Courses

- |         |                                     |   |
|---------|-------------------------------------|---|
| COM 205 | Intercultural Communication         | 3 |
| COM 225 | Interpersonal Communication         | 3 |
| COM 226 | Nonverbal Communication             | 3 |
| COM 345 | Organizational Communication I      | 3 |
| COM 347 | Negotiation and Conflict Resolution | 3 |
| COM 348 | Facilitation                        | 3 |
| COM 425 | Mediation                           | 3 |
| COM 426 | Mediation Practicum                 | 3 |
| SPE 321 | Small Group and Team Communication  | 3 |



# Computer Systems Engineering Technology Department

Randal Albert, *Department Chair*

Jay Bockelman, *Wilsonville Operations  
Program Director, Software Engineer-  
ing Technology and Embedded Systems  
Engineering Technology.*

Todd Breedlove, *Program Director, Software  
Engineering Technology*

Doug Lynn, *Program Director, Computer  
Engineering Technology*

Jim Long, *Program Director, Embedded  
Systems Engineering Technology*

Sherry Yang, *Curriculum Coordinator,  
Software Engineering Technology*

Phong Nguyen, *Curriculum Coordinator,  
Computer Engineering Technology*

*Professors:* R. Albert, J. Bockelman, T.  
Breedlove, R. Carestia, C. Caldwell, C.  
Kansaku, J. Long, D. Metzler, S. Yang

*Associate Professors:* D. Lynn, P. Nguyen

## Degrees Offered

Bachelor of Science in Computer Engi-  
neering Technology

Bachelor of Science in Software Engineer-  
ing Technology

Bachelor of Science in Embedded Systems  
Engineering Technology

Associate of Engineering in Computer  
Engineering Technology

Associate of Engineering in Software Engi-  
neering Technology

## Common First-Year Curriculum

The Bachelor of Science in Computer Engi-  
neering Technology, Bachelor of Science in  
Software Engineering Technology, Bachelor  
of Science in Embedded Systems Engineer-  
ing Technology, the Associate of Engineering  
in Computer Engineering Technology and  
the Associate of Engineering in Software  
Engineering Technology all share a common  
first-year curriculum.

## Curriculum

Required courses and recommended terms  
during which they should be taken:

Freshman Year		Fall
CST 102	Introduction to Computer Systems	3
CST 162	Introduction to Digital Logic	4
MATH 111	College Algebra	4
PSY 201	Psychology	3
WRI 121	English Composition	3
<b>Total</b>		<b>17</b>

Freshman Year		Winter
CST 116	C++ Programming I	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
WRI 122	Argumentative Writing	3
	Humanities elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
CST 105	Introduction to Computer Systems III	1
CST 126	C++ Programming II	4
CST 131	Computer Architecture	3
MATH 251	Differential Calculus	4
SPE 111	Public Speaking	3
<b>Total</b>		<b>15</b>

# Computer Engineering Technology

## Degrees Offered

Bachelor of Science in Computer Engi-  
neering Technology

Associate of Engineering in Computer  
Engineering Technology

## Bachelor of Science and Associate of Engineering Degrees

All students who complete the curriculum  
requirements in Computer Engineering  
Technology will be knowledgeable in the  
theory and applications of both computer  
hardware and software.

## Required Student Equipment

Successful completion of this degree requires  
intensive, hands-on use of computers.  
Therefore, all students are required to own  
their own computer. To ensure compatibility

with campus-wide computers and networks,  
students should consult a department faculty  
member for a specification sheet. Financial  
aid may be available to help defray the cost of  
this equipment. Please consult the Financial  
Aid Office at Oregon Tech.

## Career Opportunities

Work in the field of computer engineering  
technology includes: application specific  
integrated circuit development, firmware  
development, embedded systems design, soft-  
ware development, testing and applications of  
technology.

Computer engineering technology graduates  
will be involved in development of hardware,  
software and embedded applications that  
adapt digital logic and computer systems to  
solve problems in a wide range of industries  
from industrial manufacturing to consumer  
electronics. In addition, they may be involved

in product testing and qualification or in ap-  
plication engineering, customer support, sales  
and public relations.

The associate's degree curriculum gives the  
student a strong foundation in both hardware  
and software aspects of computing, while  
also furnishing a solid background in general  
education subjects including mathematics,  
physics and communication. The associate  
degree graduate qualifies as a technician who  
is productive immediately upon entering the  
work force. The associate's degree also pro-  
vides a way for students who obtain degrees  
in related disciplines to add breadth to their  
education.

The bachelor's curriculum goes beyond the  
associate's degree curriculum providing  
the greater depth and breadth of technical  
capability necessary for an engineering  
technologist. The graduate is qualified to as-

sume a responsible position in business or industry. Graduates may be responsible for the development, use and the maintenance of computing systems, and for the supervision of personnel.

New careers are constantly evolving in both the hardware and software branches of this field. A diversified study allows the graduate to quickly adapt to changing market conditions.

### Curriculum Mission and Objectives

The mission of the Computer Engineering Technology (CET) Degree program in the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to provide an excellent education incorporating industry-relevant, applied laboratory-based design and analysis to our students. The program is to serve a constituency consisting of its Alumni, employers in the high-technology industry and the members of our IAB. Major components of the CET program's mission in the CSET Department are to:

- educate computer engineering technology students to meet current and future industrial challenges;
- promote a sense of scholarship, leadership and professional service among our graduates;
- enable students to create, develop, and disseminate knowledge for the applied engineering environment;
- expose students to a cross-disciplinary educational program;
- provide high tech industry employers with graduates in the computer engineering technology profession, a profession which is increasingly being driven by advances in technology.

### CET Bachelor of Science Program Educational Objectives

Alumni of the Computer Engineering Technology (CET) Bachelor Degree program may be employed in a wide range of high tech industries from industrial manufacturing to consumer electronics where they will be involved in solving problems through the development of hardware, software and embedded applications. Alumni may be involved in product design, testing and qualification, application engineering, customer support, sales, or public relations.

1. Alumni will demonstrate technical competency through success in computer engineering technology positions and/or pursuit of engineering or engineering technology graduate studies if desired.
2. Alumni will demonstrate competencies in communication and teamwork skills by assuming increasing levels of responsibility and/or leadership or managerial roles.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

### CET Associate Degree Program Education Objectives

Alumni of the Computer Engineering Technology (CET) Associate Degree program may be employed as technicians or in support roles in a wide range of high tech industries from industrial manufacturing to consumer electronics. Alumni may be involved in product testing and qualification, customer support, sales, or public relations.

1. Alumni will demonstrate technical competence through success in computer engineering technician positions.
2. Alumni will demonstrate competencies in communication and teamwork skills through positive contributions to team based engineering projects.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

According to current statistics, one third of students who obtain the CET Associate degree also obtain a bachelor degree in a related discipline, most often a bachelor degree in Software. In this case, the Associate degree adds breadth to their education. Alumni in this category would be expected to perform at a level consistent with the bachelor degree program educational objectives.

### Cooperative Field Experience

The cooperative program includes work experience during the junior and senior years. The co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

A student must have junior standing in Computer Engineering Technology to be considered for this program.

### Accreditation

The Computer Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission (ETAC), Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

### Degree Requirements

Associate of Engineering Technology degree students must complete 96 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Computer Engineering Technology degree requires 92 additional credit hours, for a total of 188 credits, as prescribed by the curriculum outline.

## Bachelor of Science in Computer Engineering Technology

### Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>	<u>Junior Year</u>		<u>Fall</u>
CST 102	Introduction to Computer Systems	3	CST 337	Embedded System Architecture	5
CST 162	Introduction to Digital Logic	4	CST 335	I/O Device Interfacing Techniques	4
MATH 111	College Algebra	4	CST 371	Embedded Systems Development I	4
PSY 201	Psychology	3	PHY 221	General Physics with Calculus	4
WRI 121	English Composition	3	<b>Total</b>		<b>17</b>
<b>Total</b>		<b>17</b>			
<u>Freshman Year</u>		<u>Winter</u>	<u>Junior Year</u>		<u>Winter</u>
CST 116	C++ Programming I	4	CST 331	Microprocessor Peripheral Interfacing	5
CST 130	Computer Organization	3	CST 372	Embedded Systems Development II	3
MATH 112	Trigonometry	4	EE 321	Electronics I	5
WRI 122	Argumentative Writing	3	PHY 222	General Physics with Calculus	4
	Humanities elective	3	<b>Total</b>		<b>17</b>
<b>Total</b>		<b>17</b>			
<u>Freshman Year</u>		<u>Spring</u>	<u>Junior Year</u>		<u>Spring</u>
CST 105	Introduction to Computer Systems III	1	CST 351	Advanced PLD Circuits	3
CST 126	C++ Programming II	4	CST 373	Embedded Systems Development III	2
CST 131	Computer Architecture	3	PHY 223	General Physics with Calculus	4
MATH 251	Differential Calculus	4	WRI 327	Advanced Technical Writing	3
SPE 111	Public Speaking	3		Humanities elective	3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>15</b>
<u>Sophomore Year</u>		<u>Fall</u>	<u>Senior Year</u>		<u>Fall</u>
CST 133	Digital Electronics II – Sequential Logic with HDL	4	BUS 304	Engineering Management	3
CST 134	Instrumentation	1	CST 344	Intermediate Computer Architecture	3
CST 250	Computer Assembly Language	4	CST 441	Logic Synthesis with VHDL+ Social Science elective	3
MATH 252	Integral Calculus	4		Technical elective*	3
WRI 227	Technical Report Writing	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>16</b>			
<u>Sophomore Year</u>		<u>Winter</u>	<u>Senior Year</u>		<u>Winter</u>
CST 204	Introduction to Microcontrollers	4	CST 418	Data Communications and Networks	3
CST 231	Computer Design with Programmable Logic	3	CST 442	Advanced Computer Architecture	3
CST 232	Computer Design with Programmable Logic Laboratory	1	CST 451	ASIC Design using FPGAs+	4
EE 221	Circuits I	4	MGT 345	Engineering Economy	3
MATH 254N	Vector Calculus I	4		Social Science elective	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>16</b>
<u>Sophomore Year</u>		<u>Spring</u>	<u>Senior Year</u>		<u>Spring</u>
CST 240	UNIX	3	CST 464	RISC-Based Microprocessor Systems	4
EET 237	AC Circuits, Filters and Signals	3		Humanities elective	3
EET 238	AC Circuits, Filters and Signals Laboratory	1	<b>Total</b>		<b>13</b>
SPE 321	Small Group and Team Communication	3			
	Advanced Math elective**	4			
<b>Total</b>		<b>14</b>			

**Total Credits Required for B.S. Computer Engineering Technology:** 188

## Associate of Engineering in Computer Engineering Technology

### Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>	<u>Freshman Year</u>		<u>Fall</u>
CST 102	Introduction to Computer Systems	3	CST 102	Introduction to Computer Systems	3
CST 162	Introduction to Digital Logic	4	CST 162	Introduction to Digital Logic	4
MATH 111	College Algebra	4	MATH 111	College Algebra	4
WRI 121	English Composition	3	WRI 121	English Composition	3
PSY 201	Psychology	3	PSY 201	Psychology	3
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>17</b>
<u>Freshman Year</u>		<u>Winter</u>	<u>Freshman Year</u>		<u>Winter</u>
CST 116	C++ Programming I	4	CST 116	C++ Programming I	4
CST 130	Computer Organization	3	CST 130	Computer Organization	3
MATH 112	Trigonometry	4	MATH 112	Trigonometry	4
WRI 122	Argumentative Writing	3	WRI 122	Argumentative Writing	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>14</b>
<u>Freshman Year</u>		<u>Spring</u>	<u>Freshman Year</u>		<u>Spring</u>
CST 105	Introduction to Computer Systems III	1	CST 105	Introduction to Computer Systems III	1
CST 126	C++ Programming II	4	CST 126	C++ Programming II	4
CST 131	Computer Architecture	3	CST 131	Computer Architecture	3
MATH 251	Differential Calculus	4	MATH 251	Differential Calculus	4
SPE 111	Public Speaking	3	SPE 111	Public Speaking	3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>15</b>
<u>Sophomore Year</u>		<u>Fall</u>	<u>Sophomore Year</u>		<u>Fall</u>
CST 133	Digital Electronics II – Sequential Logic with HDL	4	CST 133	Digital Electronics II – Sequential Logic with HDL	4
CST 134	Instrumentation	1	CST 134	Instrumentation	1
CST 250	Computer Assembly Language	4	CST 250	Computer Assembly Language	4
MATH 252	Integral Calculus	4	MATH 252	Integral Calculus	4
WRI 227	Technical Report Writing	3	WRI 227	Technical Report Writing	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>16</b>
<u>Sophomore Year</u>		<u>Winter</u>	<u>Sophomore Year</u>		<u>Winter</u>
CST 204	Introduction to Microcontrollers	4	CST 204	Introduction to Microcontrollers	4
CST 231	Computer Design with Programmable Logic	3	CST 231	Computer Design with Programmable Logic	3
CST 232	Computer Design with Programmable Logic Laboratory	1	CST 232	Computer Design with Programmable Logic Laboratory	1
EE 221	Circuits I	4	EE 221	Circuits I	4
PHY 221	General Physics with Calculus	4	PHY 221	General Physics with Calculus	4
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>16</b>
<u>Sophomore Year</u>		<u>Spring</u>	<u>Sophomore Year</u>		<u>Spring</u>
CST 240	UNIX	3	CST 240	UNIX	3
EET 237	AC Circuits, Filters and Signals	3	EET 237	AC Circuits, Filters and Signals	3
EET 238	AC Circuits, Filters and Signals Laboratory	1	EET 238	AC Circuits, Filters and Signals Laboratory	1
PHY 222	General Physics with Calculus	4	PHY 222	General Physics with Calculus	4
	Humanities elective	3		Humanities elective	3
	Social Science elective	3		Social Science elective	3
	Elective	1		Elective	1
<b>Total</b>		<b>18</b>	<b>Total</b>		<b>18</b>

**Total Credits Required for Associate of Engineering in Computer Engineering Technology:** 96

## Concurrent Degree

The CSET Department provides the opportunity for the interested student to earn a bachelor's degree in computer engineering technology and software engineering technology concurrently. Such concurrent degree holders are highly sought after in industry since they know and understand both the hardware and software aspects of computers. The purpose of the concurrent CET/SET Degree Program is to challenge the brightest and most motivated students to become even better prepared for the job market, extending their time in college by an additional year. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science degree in Computer Engineering Technology with the exception of WRI 327, the CST elective and the MATH elective.

CST 136	Object-Oriented Programming with C++	4
CST 211	Data Structures	4
CST 229	Introduction to Grammars	4
CST 236	Software Systems Testing	4
CST 238	Graphical User Interface Programming	4
CST 276	Software Design Patterns	4
CST 320	Compiler Methods	4
CST 324	Database Systems and Design	4
CST 334	Project Proposal	1
CST 352	Operating Systems	4
CST 412	Senior Development Project	3
CST 422	Senior Development Project	3
CST 432	Senior Development Project	2
CST 415	Computer Networks	4
	CST Technical electives*	9
	MATH elective**	3/4
MATH 465	Mathematical Statistics	4
WRI 327	Advanced Technical Writing	
or		
WRI 350	Documentation Development	3

- \* One elective must be a CET hardware technical elective—a Hardware CST 407, CST 345 or CST 456.
- \* One elective must be a SET software technical elective—CST 346, CST 356, CST 405, a Software CST 407, CST 425, CST 426, CST 462, CST 465 or CST 466.
- \*\* MATH 321, MATH 322, MATH 327, MATH 341, MATH 342, or MATH 451.

# Embedded Systems Engineering Technology

## Degree Offered

Bachelor of Science in Embedded Systems Engineering Technology

## Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

## Career Opportunities

The Department of Computer Systems Engineering Technology offers a Bachelor of Science degree in Embedded Systems Engineering Technology (ESET) designed to build and enhance student's knowledge and skills in this high demand field. Embedded systems play an important role in society. They are the products that contain computing capabilities which are found throughout a wide spectrum of applications. Examples of embedded systems can be found in areas ranging from the entertainment industry to office systems; health care to telecommunications. Embedded systems encompass such diverse products as interactive multimedia, printers, medical equipment, avionics equipment, kitchen appliances, mobile phones, and automotive

engine management units. Engineering and technological challenges abound in the design and development of such innovative products due to the high level integration of hardware and software. As they become more complex and time to market shrinks there is increasing need for skill and creativity on the part of the Embedded System Engineering Technology graduate.

If you want to:

- develop skills in design and implementation of firmware for embedded systems,
- expand knowledge and apply new ideas in practical design,
- gain hands-on experience in embedded system design,
- bridge the gap between software and hardware design,
- enhance your career opportunities in a variety of high demand areas of industrial applications, then the Embedded Systems Engineering Technology Program is the place for you.

## Objective of the Curriculum

The goal of the Embedded Systems Program is to prepare students with the skills demanded by real-world industrial applications. Key to this process is the direct involvement of the embedded systems industries. Specific areas of preparation include:

- Embedded systems design methods—methods and techniques specific to the creation of an embedded system that integrates both software and hardware to fulfill a set of requirements.
- Software engineering methods—methods specific to development of software for embedded systems, including implementation, maintenance and testing.
- Systems software development—device driver development, multiprocessing control systems, and the software necessary to directly access and manipulate hardware.
- Architectural elements of embedded systems—methods and techniques for designing and implementing hardware components for embedded systems such as application-specific integrated circuits and System-On-a-Chip (SoC) technology.
- Real-time high-reliability and high availability processing—methods and techniques necessary for understanding, evaluating and addressing quality attributes most often associated with embedded systems such as real-time deadlines, high availability, survivability, and safety.
- Data communications—methods and techniques for developing distributed systems within embedded environments that use physical or wireless networking.

## Cooperative Field Experience

The cooperative program includes work experience during the junior and senior years. The co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

## Degree Requirements

The Bachelor of Science in Embedded Systems Engineering Technology requires 196 credit hours as prescribed by the curriculum outline.

# Bachelor of Science in Embedded Systems Engineering Technology Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Fall</b>
CST 102	Introduction to Computer Systems	3	CST 315	Embedded Sensor Interfacing and I/O	4
CST 162	Introduction to Digital Logic	4	CST 337	Embedded System Architecture	5
MATH 111	College Algebra	4	CST 371	Embedded Systems Development I	4
PSY 201	Psychology	3	PHY 221	General Physics with Calculus	4
WRI 121	English Composition	3	<b>Total</b>		<b>17</b>
<b>Total</b>		<b>17</b>			
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Winter</b>
CST 116	C++ Programming I	4	CST 345	Hardware/Software Co-Design	4
CST 130	Computer Organization	3	CST 372	Embedded Systems Development II	3
MATH 112	Trigonometry	4	PHY 222	General Physics with Calculus	4
WRI 122	Argumentative Writing	3	MATH 465	Mathematical Statistics	4
	Humanities elective	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>17</b>			
<b>Freshman Year</b>		<b>Spring</b>	<b>Junior Year</b>		<b>Spring</b>
CST 105	Introduction to Computer Systems III	1	CST 334	Project Proposal	1
CST 126	C++ Programming II	4	CST 347	Real-Time Embedded Operating Systems	4
CST 131	Computer Architecture	3	CST 373	Embedded Systems Development III	2
MATH 251	Differential Calculus	4	WRI 350	Documentation Development	3
SPE 111	Public Speaking	3		Laboratory Science elective	4
<b>Total</b>		<b>15</b>		Social Science elective	3
			<b>Total</b>		<b>17</b>
<b>Sophomore Year</b>		<b>Fall</b>	<b>Senior Year</b>		<b>Fall</b>
CST 133	Digital Electronics II—Sequential Logic with HDL	4	CST 412	Senior Development Project	3
CST 134	Instrumentation	1	CST 455	System on a Chip Design	4
CST 136	Object-Oriented Programming with C++	4	BUS 304	Engineering Management	3
CST 250	Computer Assembly Language	4		Technical elective	3
MATH 252	Integral Calculus	4		Social Science elective	3
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>16</b>
<b>Sophomore Year</b>		<b>Winter</b>	<b>Senior Year</b>		<b>Winter</b>
CST 204	Introduction to Microcontrollers	4	CST 422	Senior Development Project	3
CST 231	Computer Design with Programmable Logic	3	CST 417	Embedded Networking	4
CST 232	Computer Design with Programmable Logic Laboratory	1	CST 456	Embedded System Testing	4
EE 221	Circuits I	4	MGT 345	Engineering Economy	3
MATH 254N	Vector Calculus I	4		Humanities elective	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>17</b>
<b>Sophomore Year</b>		<b>Spring</b>	<b>Senior Year</b>		<b>Spring</b>
CST 211	Data Structures	4	ANTH 452	Globalization	3
CST 240	UNIX	3	CST 432	Senior Development Project	2
CST 276	Software Design Patterns	4	CST 466	Embedded System Security	3
EET 237	AC Circuits, Filters and Signals	3	SPE 321	Small Group and Team Communication	3
EET 238	AC Circuits, Filters and Signals Laboratory	1		Humanities elective	3
WRI 227	Technical Report Writing	3	<b>Total</b>		<b>14</b>
<b>Total</b>		<b>18</b>			

*Total Credits Required for B.S. Embedded Systems Engineering Technology: 196*

# Software Engineering Technology

## Degrees Offered

Bachelor of Science in Software Engineering Technology

Associate of Engineering in Software Engineering Technology

Students who complete the curriculum requirements in Software Engineering Technology will be qualified and knowledgeable in the establishment and use of sound engineering principles (methods) in order to create software of all types that is reliable and works on real machines.

## Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own a computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

## Career Opportunities

Bachelor of Science in Software Engineering Technology degree graduates find employment as software engineers, systems engineers, systems analysts, programmer/analysts, researchers and assistants, consultants, customer engineers, etc., responsible for the application, design, development, and implementation of software in all areas of industry, government and education.

Software engineering technologists' career paths will be many and varied. They may concentrate on hardware-support activities such as new design/development, testing, customer service and the like. They may concentrate on software specification, design, construction and testing through implementation and maintenance.

Graduates may get involved with administrative or project management by beginning as a member of an applications development team and progressing into management. They may pursue careers in product development, marketing, sales, design, and support. Students completing the requirements for the Associate of Engineering degree should consider themselves as entry-level trainees in the careers mentioned.

## High School Preparation

Coursework in computer science, mathematics, and physical science will aid students in their progress in this program.

## Bachelor Program Mission

The mission of the Software Engineering Technology (SET) Bachelor's Degree Program within Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for productive careers in industry and government by providing an excellent education incorporating industry-relevant, applied laboratory-based instruction in both the theory and application of software engineering. The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET Program's mission in the CSET Department are:

- To educate a new generation of Software Engineering Technology students to meet current and future industrial challenges and emerging software trends;
- To promote a sense of scholarship, leadership and professional service among our graduates;
- To enable our students to create, develop, apply and disseminate knowledge within the software development environment;
- To expose our students to cross-disciplinary educational programs;
- To provide government and high tech industry employers with graduates in software engineering and related professions.

## Bachelor Program Educational Objectives

The Program Educational Objectives of Oregon Tech's Software Engineering Technology Program are to produce graduates that:

- Use their knowledge of engineering to creatively and innovatively solve difficult computer systems problems;
- Regularly engage in exploring, learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems;
- Will be an effective software development team member that contributes innovative software design solutions to

the resolution of business, scientific or government computer systems problems;

- Will communicate effectively and successfully, both individually and within multi-disciplinary teams.

## Associate Program Mission

The mission of the Software Engineering Technology (SET) Associate Degree program within the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for entry level careers in the software industry and government by providing applied laboratory based instruction. The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET program's mission in the CSET Department are:

- To provide a new generation of Software Engineering Technology students with a solid background in computer programming
- To enable our students to create, develop and apply knowledge within a technical software environment
- To provide government and high tech industry employers with entry level graduates in computer programming and related professions.

## Associate Program Educational Objectives

The Program Educational Objectives of Oregon Tech's Software Engineering Technology program are to produce graduates that:

- Assist in solving computer systems problems using their knowledge of computer programming
- Regularly engage in learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems
- Will communicate effectively and successfully in the workplace.

## Cooperative Field Experience

The cooperative program includes work experience usually during the junior and senior years. The co-op period would be an employment arrangement with an employer in the area of the student's major field with

normal salary and academic credit. These arrangements are made on an individual basis, and the student is under no obligation to accept permanent employment with any previous cooperating employer. A student must be ready to enter the sophomore year in Software Engineering Technology to be considered for this program.

## Accreditation

The Software Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission

(ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Degree Requirements

Associate of Engineering Technology degree students must complete 98 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Software Engineering Technology degree requires 186 credit hours as prescribed by the curriculum outline.

# Bachelor of Science in Software Engineering Technology

## Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CST 102	Introduction to Computer Systems	3
CST 162	Introduction to Digital Logic	4
MATH 111	College Algebra	4
PSY 201	Psychology	3
WRI 121	English Composition	3
<b>Total</b>		<b>17</b>

Freshman Year		Winter
CST 116	C++ Programming I	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
WRI 122	Argumentative Writing	3
	Humanities elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
CST 105	Introduction to Computer Systems III	1
CST 126	C++ Programming II	4
CST 131	Computer Architecture	3
MATH 251	Differential Calculus	4
SPE 111	Public Speaking	3
<b>Total</b>		<b>15</b>

Sophomore Year		Fall
CST 136	Object-Oriented Programming with C++	4
CST 250	Computer Assembly Language	4
MATH 252	Integral Calculus	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>15</b>

Sophomore Year		Winter
CST 211	Data Structures	4
CST 240	UNIX	3
CST 276	Software Design Patterns	4
MATH 254N	Vector Calculus I	4
<b>Total</b>		<b>15</b>

Sophomore Year		Spring
CST 223	Concepts of Programming Languages	3
CST 236	Software Systems Testing	4
CST 238	Graphical User interface programming	4
MATH 327	Discrete Mathematics	4
<b>Total</b>		<b>15</b>

Junior Year		Fall
CST 229	Introduction to Grammars	3
CST 316	Software Process Management	4
CST 324	Database Systems and Design	4
PHY 221	General Physics with Calculus	4
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>18</b>

Junior Year		Winter
CST 320	Compiler Methods	4
CST 326	Software Design and Implementation I	4
PHY 222	General Physics with Calculus	4
WRI 350	Documentation Development	3
<b>Total</b>		<b>15</b>

Junior Year		Spring
CST 334	Project Proposal	1
CST 336	Software Design and Implementation II	4
CST 352	Operating Systems	4
PHY 223	General Physics with Calculus	4
	Social Science elective	3
<b>Total</b>		<b>16</b>

Senior Year		Fall
BUS 304	Engineering Management	3
CST 412	Senior Development Project	3
CST 415	Computer Networks	4
	Technical elective*	3
<b>Total</b>		<b>13</b>

Senior Year		Winter
CST 422	Senior Development Project	3
MATH 465	Mathematical Statistics	4
	Humanities elective	3
	Social Science elective	3
	Technical elective*	3
<b>Total</b>		<b>16</b>

Senior Year		Spring
ANTH 452	Globalization	3
CST 432	Senior Development Project	2
MGT 345	Engineering Economy	3
	Humanities elective	3
	Technical elective*	3
<b>Total</b>		<b>14</b>

**Total Credits Required for B.S. Software Engineering Technology: 186**

\* Three technical elective courses (two upper division) chosen from the following list are required. Two electives must also be CST courses (excluding CST 390 and CST 490).

The acceptable courses are: CST 204 Introduction to Microcontrollers • CST 311 Advanced Data Structures and Algorithm Analysis • CST 328 Computer Graphics • CST 338 Computer Modeling and Simulation • CST 340 Advanced UNIX • CST 405 Directed Study • CST 407 Seminar • CST 418 Data Communications and Networks • CST 420 Effective C++ and STL • CST 425 Advanced Networks and Telecommunications • CST 426 Introduction to Artificial Intelligence • CST 436 Robotics • CST 442 Advanced Computer Architecture • CST 462 Real-Time Operating Systems • CST 490 Co-op Field Practice • MATH 253N Sequences and Series • MATH 321 Applied Differential Equations I • MATH 322 Applied Differential Equations II • MATH 341 Linear Algebra I • MATH 342 Linear Algebra II • MATH 451 Numerical Methods I

# Associate of Engineering in Software Engineering Technology

## Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>
CST 102	Introduction to Computer Systems	3
CST 162	Introduction to Digital Logic	4
MATH 111	College Algebra	4
PSY 201	Psychology	3
WRI 121	English Composition	3
<b>Total</b>		<b>17</b>

<b>Freshman Year</b>		<b>Winter</b>
CST 116	C++ Programming I	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
WRI 122	Argumentative Writing	3
	Humanities elective	3
<b>Total</b>		<b>17</b>

<b>Freshman Year</b>		<b>Spring</b>
CST 105	Introduction to Computer Systems III	1
CST 126	C++ Programming II	4
CST 131	Computer Architecture	3
MATH 251	Differential Calculus	4
SPE 111	Public Speaking	3
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Fall</b>
CST 136	Object-Oriented Programming With C++	4
MATH 252	Integral Calculus	4
WRI 227	Technical Report Writing	3
	Social Science elective	3
	Technical elective*	3
<b>Total</b>		<b>17</b>

<b>Sophomore Year</b>		<b>Winter</b>
CST 211	Data Structures	4
CST 240	UNIX	3
CST 276	Software Design Patterns	4
PHY 221	General Physics with Calculus	4
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Spring</b>
CST 223	Concepts of Programming Languages	3
CST 236	Software Systems Testing	4
CST 238	Graphical User Interface Programming	4
	Social Science elective	3
	Elective	3
<b>Total</b>		<b>17</b>

**Total Credits Required for Associate of Engineering in Software Engineering Technology: 98**

\* See your advisor for acceptable elective classes.



# Dental Hygiene Department

Janita Cope, *Department Chair*

*Professor:* J. Schultz

*Associate Professor:* J. Cope

*Assistant Professors:* C. Devens, P. Gates, E. Gordon S. Hopper, V. Points, P. Russell

*Instructors:* K. Clarke, H. Denton, P. Hendrix, K. Sroufe

## Degrees Offered

Bachelor of Science in Dental Hygiene  
Associate of Applied Science in Dental Hygiene

A Bachelor of Science in Dental Hygiene is offered on the Oregon Tech Klamath Falls campus and on the Chemeketa Community College campus in Salem. An Associate of Applied Science in Dental Hygiene is offered at ODS College of Dental Sciences in La Grande.

The Dental Hygiene Programs prepare students for entry into the dental hygiene profession. Upon successful completion of the program, the graduate is eligible to apply for examination and state licensure.

## Accreditation

The dental hygiene curriculum is fully accredited by the American Dental Association Commission on Dental Accreditation, a specialized accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. The program is recognized by the Oregon Board of Dentistry, Oregon Dental Association and the Oregon Dental Hygienists' Association.

## Program Purpose

The dental hygiene programs prepare students to enter the dental hygiene profession. Graduates are prepared to sit for national and regional examinations and to meet qualifications for licensure. Bachelor degree graduates are prepared for post graduate education in dental hygiene and other related fields of study.

## Career Opportunities

Working collaboratively with dentists, dental hygienists provide oral health preventive and therapeutic services to the public. Dental hygienists are most commonly employed in private dental offices but may provide oral

health care services in hospitals, nursing homes and schools. Career options such as research, public health, education, or administration are possible for bachelor degree program graduates. Employment opportunities exist abroad with governmental agencies, companies or in private practice.

## Student Preparation

A science background is beneficial to individuals interested in any health sciences profession. Students considering a career in dental hygiene should take a college-bound course of study in high school that includes algebra, chemistry, and biology or human anatomy and physiology.

## Admissions Procedures

Any student who meets the general admissions requirements may enroll in Pre-Dental Hygiene courses (freshman year). A limited number of seats are available in the professional courses (sophomore, junior, and senior years). Students are selected to enter the professional program through an application process.

The application deadline is April 15 of the calendar year of enrollment. To be eligible for admission into the Dental Hygiene Program the following minimum eligibility requirements must be met:

1. Applicants must have on file with the Oregon Tech Office of Admissions an official *Application for Admission* to Oregon Tech, accompanied by a \$50 non-refundable fee and official transcripts of each college or university attended. Admission to Oregon Tech is independent of admission to the Dental Hygiene Program. All applicants to Oregon Tech are admitted as pre-dental hygiene majors until acceptance into the dental hygiene program.
2. Applicants must have successfully completed or be in progress of completing all freshmen pre-dental hygiene courses. Completion of Introduction to Dental Hygiene (DH 100 on campus or DHE 100 online) is required by the end of spring term. All other prerequisite (freshman) courses must be completed by the end of summer term.
3. Applicants must have a minimum cumulative 2.50 GPA in previous college work.

4. Applicants must submit a *Dental Hygiene Application for Admission*, related forms, including official transcripts, and \$75 non-refundable application fee directly to the Dental Hygiene Department by April 15 of the calendar year of enrollment. Detailed information and forms can be found on the Oregon Tech Dental Hygiene Program web page, [www.oit.edu/dentalhygiene](http://www.oit.edu/dentalhygiene).

## Program Requirements

Dental hygiene students admitted to the Dental Hygiene Program (sophomore, junior, senior years) are required to purchase background checks. Dental hygiene students must purchase instruments and other supplies to be used during clinical practice and pay additional fees associated with dental hygiene courses.

## Bachelor of Science in Dental Hygiene Curriculum

The following are required courses and recommended terms for students attending on the Klamath Falls campus. Please visit [www.oit.edu/dentalhygiene](http://www.oit.edu/dentalhygiene) for transfer information from other Oregon colleges and for recommended course sequencing for those attending on the Chemeketa Community College campus.

### Pre-Dental Hygiene

Freshman Year		Fall
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
DH 100	Introduction to Dental Hygiene	2
MATH 111	College Algebra	4
<b>Total</b>		<b>16</b>

Freshman Year		Winter
BIO 105	Microbiology	4
BIO 232	Human Anatomy and Physiology II	4
CHE 102	Elementary Chemistry	3
CHE 105	Elementary Chemistry Laboratory	1
SOC 204	Introduction to Sociology	3
WRI 121	English Composition	3
<b>Total</b>		<b>18</b>

Freshman Year		Spring
BIO 205	Nutrition	3
BIO 233	Human Anatomy and Physiology III	4
CHE 103	Elementary Chemistry	3
CHE 106	Elementary Chemistry Laboratory	1
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>17</b>

### Professional Courses

Sophomore Year		Fall
CHE 360	Clinical Pharmacology for the Health Professions	3
DH 221	Dental Hygiene Clinical Practice and Seminar I	4
DH 225	Head and Neck Anatomy, Histology and Embryology	3
DH 240	Prevention I	3
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>16</b>

Sophomore Year		Winter
DH 222	Dental Hygiene Clinical Practice and Seminar II	4
DH 241	Prevention II	3
DH 244	General and Oral Pathology	3
DH 252	Oral Radiology I	3
DH 275	Dental Ethics	2
DH 366	Dental Anatomy	2
<b>Total</b>		<b>17</b>

Sophomore Year		Spring
DH 223	Dental Hygiene Clinical Practice and Seminar III	3
DH 242	Prevention III	3
DH 253	Oral Radiology II	2
DH 254	Introduction to Periodontology	1
DH 267	Emergency Procedures	3
DH 380	Community Dental Health I Psychology elective	2
<b>Total</b>		<b>17</b>

Junior Year		Fall
BUS 317	Health Care Management	3
DH 321	Dental Hygiene Clinical Practice and Seminar IV	4
DH 340	Prevention IV	3
DH 354	Periodontology	3
DH 381	Community Dental Health II Psychology elective	2
<b>Total</b>		<b>18</b>

Junior Year		Winter
DH 322	Dental Hygiene Clinical Practice and Seminar V	3
DH 341	Prevention V	3
DH 351	Pain Management I	2
DH 382	Community Dental Health III	2
WRI 227	Technical Report Writing Humanities elective	3
<b>Total</b>		<b>16</b>

Junior Year		Spring
DH 323	Dental Hygiene Clinical Practice and Seminar VI	5
DH 344	Advanced General and Oral Pathology	3
DH 352	Pain Management II	3
DH 363	Dental Materials	3
DH 370	International Externship (optional)	1
DH 383	Community Dental Health IV	1
<b>Total</b>		<b>15/16</b>

Senior Year		Summer
BUS 331	Personal Finance	3
DH 371	International Externship (optional)	1
DH 421	Dental Hygiene Clinical Practice and Seminar VII	4
DH 461	Restorative Dentistry I	2
DH 475	Dental Hygiene Research Methods I	2
MATH 243	Introductory Statistics	4
<b>Total</b>		<b>15/16</b>

Senior Year		Fall
AHED 450	Instructional Methods	3
DH 372	International Externship (optional)	1
DH 422	Dental Hygiene Clinical Practice and Seminar VIII	5
DH 462	Restorative Dentistry II (optional)	2
DH 476	Dental Hygiene Research Methods II Communication elective	2
	Humanities elective	3
<b>Total</b>		<b>16/19</b>

Senior Year		Winter
DH 423	Dental Hygiene Clinical Practice and Seminar IX	5
DH 454	Dental Practice Management	3
DH 463	Restorative Dentistry III (optional)	2
DH 477	Dental Hygiene Research Methods III Humanities elective	2
	Psychology elective	3
<b>Total</b>		<b>16/18</b>

**Total Credits Required for B.S. Dental Hygiene: 197**

### Graduation Requirements

All courses listed in the curriculum for the catalog year a student begins a program must be fulfilled. Total credits required for graduation are: Bachelor of Science degree, 197; Associate of Applied Science, 154. A minimum cumulative grade point average (GPA) of 2.0 is required for graduation. Students must maintain a grade of "C" or better in all professional courses (DH and DHE), communication courses and clinical pharmacology (CHE 360) to continue in the program.

## Associate of Applied Science in Dental Hygiene

### Curriculum

Required courses and recommended terms during which they should be taken:

### Pre-Dental Hygiene

Freshman Year		Fall	Sophomore Year		Spring
BIO 200	Medical Terminology	2	DHE 213	Principles of Dental Hygiene III	3
BIO 231	Human Anatomy and Physiology I	4	DHE 223	Dental Hygiene Clinical Practice III	4
CHE 101	Elementary Chemistry	3	DHE 233	Periodontology	3
CHE 104	Elementary Chemistry Laboratory	1	DHE 261	Dental Health Education	3
DHE 100	Introduction to Dental Hygiene I	2	DHE 275	Dental Ethics	2
MATH 105	Collegiate Mathematics		DHE 344	Advanced General and Oral Pathology	3
or			<b>Total</b>		<b>18</b>
MATH 111	College Algebra	4			
<b>Total</b>		<b>16</b>	<b>Junior Year</b>		<b>Summer</b>

Freshman Year		Winter	Junior Year		Fall
BIO 105	Microbiology	4	DHE 311	Principles of Dental Hygiene IV	3
BIO 232	Human Anatomy and Physiology II	4	DHE 321	Dental Hygiene Clinical Practice IV	4
CHE 102	Elementary Chemistry	3	DHE 333	Periodontal Therapy	3
CHE 105	Elementary Chemistry Laboratory I	1	DHE 351	Dental Analgesia	3
SPE 111	Public Speaking	3	DHE 380	Oral Health Planning and Care I	3
WRI 121	English Composition	3	<b>Total</b>		<b>16</b>
<b>Total</b>		<b>18</b>	<b>Junior Year</b>		<b>Fall</b>

Freshman Year		Spring	Junior Year		Winter
BIO 205	Nutrition	3	DHE 312	Principles of Dental Hygiene V	3
BIO 233	Human Anatomy and Physiology III	4	DHE 320	Dental Materials and Chairside Assisting	3
CHE 103	Elementary Chemistry	3	DHE 322	Dental Hygiene Clinical Practice V	4
CHE 106	Elementary Chemistry Laboratory	1	DHE 381	Oral Health Planning and Care II	4
SOC 204	Introduction to Sociology	3		Psychology elective	3
WRI 122	Argumentative Writing	3	<b>Total</b>		<b>17</b>
<b>Total</b>		<b>17</b>	<b>Junior Year</b>		<b>Winter</b>

### Professional Courses

Sophomore Year		Fall	Junior Year		Winter
CHE 360	Clinical Pharmacology for the Health Professions	3	DHE 313	Principles of Dental Hygiene VI	4
DHE 211	Principles of Dental Hygiene I	2	DHE 323	Dental Hygiene Clinical Practice VI	5
DHE 221	Dental Hygiene Clinical Practice I	3	WRI 227	Technical Report Writing	3
DHE 252	Oral Radiology I	3		Humanities elective	3
DHE 366	Dental Anatomy	2		Psychology elective	3
SPE 321	Small Group and Team Communication	3	<b>Total</b>		<b>18</b>
<b>Total</b>		<b>16</b>	<b>Total Credits Required for A.A.S. Dental Hygiene: 154</b>		

Sophomore Year		Winter
DHE 212	Principles of Dental Hygiene II	3
DHE 222	Dental Hygiene Clinical Practice II	4
DHE 225	Head and Neck Anatomy, Histology, and Embryology	3
DHE 244	General and Oral Pathology	3
DHE 253	Oral Radiology II	2
DHE 282	Medical and Dental Emergency Procedures	3
<b>Total</b>		<b>18</b>

## Bachelor's Degree Completion Outreach Program

This program offers dental hygienists who have earned an associate's degree the opportunity to complete a Bachelor of Science in Dental Hygiene. The degree is offered through an online web-based distance learning program.

Dental hygienists who have graduated with an associate's degree from an accredited dental hygiene program may be eligible to apply to the bachelor's degree completion program. Oregon Tech will make every effort to give maximum consideration to the transfer work presented at time of application. Typically, most professional and related science requirements are accepted. Additional coursework may be necessary to meet Oregon Tech general education requirements and a minimum of 45 credit hours must be completed through Oregon Tech to satisfy residency requirements.

### Admission Procedures

1. Complete the *Distance Education Application for Admission*. Enclose a check for \$100 payable to Oregon Institute of Technology.
2. Request that an official copy of your National Dental Hygiene Examination results be sent to the Distance Education Office. You may obtain your results at <http://www.ada.org/prof/ed/testing/nbdhe/index.asp>.
3. Mail your application and check to the Distance Education Office.
4. Mail official transcripts from all colleges you have attended directly to the Distance Education Office. Transfer courses will be evaluated to determine course equivalency of professional, science, and general education courses.

To apply, go to [www.oit.edu/dist](http://www.oit.edu/dist), print the *Distance Education Application for Admission* and *Check Sheet*, and submit all required information to the Distance Education Office.

**Courses Granted for Licensure**

DH 100	Introduction to Dental Hygiene	2
DH 221/222/223	Dental Hygiene Clinical Practice and Seminar I, II, and III	11
DH 225	Head and Neck Anatomy, Histology And Embryology	3
DH 240/241/242	Prevention I, II, and III	9
DH 244	General and Oral Pathology	3
DH 252/253	Oral Radiology I and II	5
DH 254	Introduction to Periodontology	1
DH 267	Emergency Procedures	3
DH 275	Dental Ethics	2
DH 321/322/323	Dental Hygiene Clinical Practice and Seminar IV, V, and VI	12
DH 340/341	Prevention IV and V	6
DH 344	Advanced General and Oral Pathology	3
DH 354	Periodontology	3
DH 363	Dental Materials	3
DH 366	Dental Anatomy	2
DH 380/381	Community Dental Health I, II	4
DH 421/422/423	Dental Hygiene Clinical Practice and Seminar VII, VIII, IX	14

**Oregon Tech Degree Completion Courses**

AHED 450	Instructional Methods	3
BUS 317	Health Care Management	3
BUS 331	Personal Finance	3
DH 351	Pain Management I*	2
DH 352	Pain Management II*	3
DH 401	Overview of Advanced Dental Hygiene	3
DH 453	Current Issues in Dental Hygiene	3
DH 454	Dental Practice Management	3
DH 455	Dental Hygiene Research	3
DH 470	Community Program Planning I	3
DH 471	Community Program Planning II	3
MATH 243	Introductory Statistics	4
SPE 321	Small Group and Team Communication	3
	Communication elective	3
	Humanities elective	3
	Humanities elective	3
	Social Science elective	3
	Elective approved by advisor	3

**Additional required courses (Transfer or Oregon Tech)**

BIO 105	Microbiology	4
BIO 205	Nutrition	3
BIO 231	Anatomy and Physiology I	4
BIO 232	Anatomy and Physiology II	4
BIO 233	Anatomy and Physiology III	4
CHE 101/104	Elementary Chemistry/Laboratory	4
CHE 102/105	Elementary Chemistry/Laboratory	4
CHE 103/106	Elementary Chemistry/Laboratory	4
CHE 360	Clinical Pharmacology for the Health Professions	3
MATH 105	Collegiate Mathematics	
or		
MATH 111	College Algebra	4
SOC 204	Introduction to Sociology	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 123	Research Writing	
or		
WRI 227	Technical Report Writing	3
	Humanities elective	3
	Psychology elective	3
	Psychology elective	3

\* Credits may be granted for additional specialty licensure exams.

**Graduation Requirements:**

The following requirements must be met to earn a bachelor's degree in dental hygiene from Oregon Institute of Technology:

- Transfer your dental hygiene professional courses.
- Complete general education courses required for a bachelor's degree.
- Complete the bachelor's degree completion courses.
- Complete 60 credits of upper-division (300-400 level) coursework. (You will be awarded some upper-division credit for your transferred professional courses.)
- Complete at least 45 credits from Oregon Tech.
- Maintain a grade "C" or better in all courses.

# Electrical Engineering and Renewable Energy Department

Cristina Crespo, *Department Chair*

Bruce Barnes, *Program Director, B.S. Electrical Engineering (Klamath Falls)*

Jamie Zipay, *Program Director, Renewable Energy Engineering (Klamath Falls)*

Aaron Scher, *Program Director, B.S. Electrical Engineering and B.S. Electronics Engineering Technology (Wilsonville)*

Scott Prahl, *Program Director, Optoelectronics (Wilsonville)*

Frank Rytkonen, *Program Director, B.S. Renewable Energy Engineering (Wilsonville)*

Hope Corsair, *Program Director, M.S. Renewable Energy Engineering (Wilsonville)*

*Professors: M. Aboy, J. Zipay*

*Associate Professors: C. Crespo, P. Dingman, S. Petrovic, S. Prahl*

*Assistant Professors: B. Barnes, H. Corsair, T. Jiru, C. Torres Garibay, F. Rytkonen, F. Shi, A. Scher, C. Stillinger, M. Vurkaç, X. Wang*

## Degrees offered

Bachelor of Science in Electrical Engineering (Klamath Falls and Wilsonville)

Bachelor of Science in Electronics Engineering Technology (Wilsonville)

Bachelor of Science in Renewable Energy Engineering (Klamath Falls and Wilsonville)

Master of Science in Renewable Energy Engineering (Wilsonville)

## Electrical Engineering

### Degrees Offered

Bachelor of Science in Electrical Engineering (Klamath Falls and Wilsonville)

Bachelor of Science in Electrical Engineering and Bachelor of Science in Renewable Energy Engineering (Concurrent Degree)

### Career Opportunities

The Bachelor of Science in Electrical Engineering (BSEE) at Oregon Tech is designed to prepare professionals to meet the needs of the growing Electrical Engineering industry. Electrical engineering is concerned with the use of electricity to transmit electric power, or to process information. Electrical engineers design, develop, test, and integrate electrical power systems and electrical machines, as well as electronic systems, including portable electronic devices, medical equipment, communication systems, radar and navigation systems, and others.

The program is designed around a set of core courses which provide a classical electrical engineering foundation, and a number of elective courses that allow students some flexibility to specialize in the areas that interest them most, such as electronics, electrical power, optoelectronics, renewable energy, etc. Emphasis is placed on practical application of engineering knowledge. The BSEE program at Oregon Tech can accommodate full-time students, transfer students, and working professionals, and provides a solid preparation for industry or graduate school. Graduates of the Electrical Engineering

Program are prepared to fulfill a wide range of functions within industry. Employers of electrical engineering graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, and semiconductor companies, among others.

The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, MBAs, and JDs.

### Objectives

The Program Educational Objectives for the BSEE program are:

1. The graduates of the BSEE program will possess a strong technical background as well as analytical, critical-thinking, and problem-solving skills that enable them to excel as professionals contributing to a variety of engineering roles within the various fields of Electrical Engineering and the high-tech industry;
2. The graduates of the BSEE program are expected to be employed in Electrical Engineering positions including (but not limited to) design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers;
3. The graduates of the BSEE program will be committed to professional develop-

ment and lifelong learning by engaging in professional or graduate education in order to stay current in their field and achieve continued professional growth;

4. The graduates of the BSEE program will be working as effective team members possessing excellent oral and written communication skills, and assuming technical and managerial leadership roles throughout their career.

### Student Preparation

Students entering the Electrical Engineering program from high school should have a minimum of: 1) Two years of high-school algebra and one year of high-school geometry and trigonometry. 2) Two years of a physical science (physics, chemistry preferred). 3) Three years of English composition. Additional mathematics, science, english, electronics, and computer languages are very helpful. Students entering the Electrical Engineering program by transfer are requested to contact the department concerning transfer of technical coursework. Those community college students completing the electrical engineering transfer program should receive full credit for the first two years of EE courses. Those students with an Associate Degree in Electronics Engineering Technology will most likely have to take two or more "bridge" courses in order to have all the lower-division requirements of the EE Program completed.

### Accreditation

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges

and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

### Degree Requirements

The Bachelor of Science in Electrical Engineering requires 184 credit hours, taking approximately four years to complete. Students in the BSEE Program must earn a grade of "C" or better in all EE courses that are prerequisites for another EE course.

### Technical Emphases

Students in the BSEE program may choose to specialize in a particular area by selecting their engineering technical elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts.

### Electrical Power

Choose 9 credits from the following list:

EE 419 Power Electronics	4
REE 243 Electrical Power	4
REE 253 Electromechanical Energy Conversion	4
REE 345 Wind Power	3
REE 453 Power System Analysis	3
REE 454 Power System Protection and Control	3
Or advisor approved technical electives	

### Microelectronics

Choose 9 credits from the following list:

EE 421 Analog IC Design	5
EE 423 CMOS Digital IC Design	5
EE 432 Advanced Digital System Design w/HDL	4
Or advisor approved technical electives	

### Optoelectronics

Choose 9 credits from the following list:

EE 351 Optical Detection & Radiometry	4
EE 352 Geometric Optics	4
EE 353 Physical Optics	4
EE 451 Lasers	4
EE 452 Waveguides & Fiber Optics	4
EE 453 Optical Metrology	4
Or advisor approved technical electives	

Note: Optoelectronics emphasis only available on Wilsonville campus.

### Renewable Energy

Choose 9 credits from the following list:

EE 419 Power Electronics	4
REE 243 Electrical Power	4
REE 253 Electromechanical Energy Conversion	4
REE 345 Wind Power	3
REE 346 Biofuels and Biomass	3
REE 412 Photovoltaic systems	3
REE 413 Electric Power Conversion Systems	3
REE 427 Greed House Accounting	3
Or advisor approved technical electives	

## Bachelor of Science in Electrical Engineering Curriculum – Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

Freshman Year	Fall
CHE 201 General Chemistry*	3
CHE 204 General Chemistry Laboratory*	1
ENGR 101 Introduction to Engineering I	2
MATH 251 Differential Calculus	4
WRI 121 English Composition	3
<b>Total</b>	<b>13</b>

Freshman Year	Winter
CHE 202 General Chemistry**	3
CHE 205 General Chemistry Laboratory**	1
ENGR 102 Introduction to Engineering II	2
MATH 252 Integral Calculus	4
PHY 221 General Physics with Calculus	4
WRI 122 Argumentative Writing	3
<b>Total</b>	<b>17</b>

Freshman Year	Spring
EE 131 Digital Electronics I	4
MATH 254N Vector Calculus I	4
PHY 222 General Physics with Calculus	4
SPE 111 Public Speaking	3
<b>Total</b>	<b>15</b>

Sophomore Year	Fall
EE 133 Digital Electronics II	4
EE 221 Circuits I	4
PHY 223 General Physics with Calculus	4
Social Science elective	3
<b>Total</b>	<b>15</b>

Sophomore Year	Winter
CST 116 C++ Programming I	4
EE 223 Circuits II	4
MATH 321 Applied Differential Equations I	4
MATH 341 Linear Algebra I	4
<b>Total</b>	<b>16</b>

Sophomore Year	Spring
EE 225 Circuits III**	4
MATH 253N Sequences and Series	4
WRI 227 Technical Report Writing	3
Humanities elective	3
Social Science elective	3
<b>Total</b>	<b>17</b>

Junior Year	Fall
EE 321 Electronics I	5
EE 331 Digital System Design with HDL	4
EE 341 Electricity and Magnetism with Transmission Lines	4
MGT 345 Engineering Economy	3
<b>Total</b>	<b>16</b>

## Bachelor of Science in Electrical Engineering Curriculum – Wilsonville Campus

Required courses and recommended terms during which they should be taken:

<b>Junior Year</b>		<b>Winter</b>
EE 323	Electronics II	5
EE 333	Microcontroller Engineering	4
EE 343	Solid-State Electronic Devices	3
WRI 327	Advanced Technical Writing****	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Spring</b>
ENGR 267	Engineering Programming	3
EE 325	Electronics III	5
EE 335	Advanced Microcontroller Engineering	4
EE 355	Control System Design	4
<b>Total</b>		<b>16</b>

<b>Senior Year</b>		<b>Fall</b>
EE 430	Linear Systems and Digital Signal Processing	5
ENGR 465	Capstone Project	2
SPE 321	Small Group and Team Communication	3
	Engineering elective*****	3
	Social Science elective	3
<b>Total</b>		<b>16</b>

<b>Senior Year</b>		<b>Winter</b>
ENGR 465	Capstone Project	2
MATH 465	Mathematical Statistics	4
	Engineering elective*****	3
	Humanities Elective	3
	Social Science elective	3
<b>Total I</b>		<b>15</b>

<b>Senior Year</b>		<b>Spring</b>
EE 401	Communication Systems	5
ENGR 465	Capstone Project	2
	Engineering Elective*****	3
	Humanities elective	3
<b>Total</b>		<b>13</b>

**Total Credits Required for B.S. Electrical Engineering:**  
184

<b>Freshman Year</b>		<b>Fall</b>
CHE 201	General Chemistry*	3
CHE 204	General Chemistry Laboratory*	1
EE 131	Digital Electronics I	4
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
<b>Total</b>		<b>15</b>

<b>Freshman Year</b>		<b>Winter</b>
CHE 202	General Chemistry**	3
CHE 205	General Chemistry Laboratory**	1
EE 133	Digital Electronics II	4
MATH 252	Integral Calculus	4
WRI 122	Argumentative Writing	3
	Social Science Elective	3
<b>Total</b>		<b>18</b>

<b>Freshman Year</b>		<b>Spring</b>
MATH 321	Applied differential Equations I	4
MATH 254N	Vector Calculus I	4
MGT 345	Engineering Economy	3
SPE 111	Public Speaking	3
	Humanities elective	3
<b>Total</b>		<b>17</b>

<b>Sophomore Year</b>		<b>Fall</b>
CST 116	C++ Programming I	4
EE 221	Circuits I	4
PHY 221	General Physics with Calculus	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Winter</b>
ENGR 267	Advanced Engineering Programming	3
EE 223	Circuits II	4
MATH 341	Linear Algebra I	4
PHY 222	General Physics with Calculus	4
	Humanities elective	3
<b>Total</b>		<b>18</b>

<b>Sophomore Year</b>		<b>Spring</b>
EE 225	Circuits III***	4
MATH 253N	Sequences and Series	4
PHY 223	General Physics with Calculus	4
	Social Science elective	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Fall</b>
EE 321	Electronics I	5
EE 333	Microcontroller Engineering	4
EE 341	Electricity and Magnetism with Transmission Lines****	4
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>16</b>

<b>Junior Year</b>		<b>Winter</b>
EE 323	Electronics II	5
EE 331	Digital System Design with HDL****	4
EE 335	Advanced Microcontroller Engineering	4
	Social Science Elective	3
<b>Total</b>		<b>16</b>

<b>Junior Year</b>		<b>Spring</b>
EE 325	Electronics III	5
EE 343	Solid State Electronic Devices	3
EE 432	Advanced Digital System Design With HDL****	4
WRI 327	Advanced Technical Writing****	3
<b>Total</b>		<b>15</b>

<b>Senior Year</b>		<b>Fall</b>
EE 355	Control System Design	4
ENGR 465	Capstone Project	2
MATH 465	Mathematical Statistics	4
	Engineering elective*****	3
<b>Total</b>		<b>13</b>

<b>Senior Year</b>		<b>Winter</b>
EE 430	Linear Systems and Digital Signal Processing	5
ENGR 465	Capstone Project	2
	Engineering elective*****	3
	Humanities Elective	3
<b>Total I</b>		<b>13</b>

<b>Senior Year</b>		<b>Spring</b>
EE 401	Communication Systems	5
ENGR 465	Capstone Project	2
	Engineering Elective*****	3
	Social Science elective	3
<b>Total</b>		<b>13</b>

**Total Credits Required for B.S. Electrical Engineering:**  
184

\* CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222, respectively.

\*\* CHE 202/5 can be substituted with an advisor approved 4 credit Math/Science elective.

\*\*\* EE 225 can be substituted with EE 320.

\*\*\*\* WRI 327 can be substituted with WRI 350.

\*\*\*\*\* Any course numbered EE 3XX, EE 4XX, REE 3XX, REE 4XX or courses included in the list for a specific degree option can be used as an engineering elective (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor approval.

\* CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222, respectively.

\*\* CHE 202/5 can be substituted with an advisor approved 4 credit Math/Science elective.

\*\*\* EE 225 can be substituted with EE 320.

\*\*\*\* Should be substituted with appropriate optoelectronics course for students pursuing an emphasis in Optoelectronics (see section on technical emphases).

\*\*\*\*\* WRI 327 can be substituted with WRI 350.

\*\*\*\*\* Can be substituted with an advisor-approved technical elective.

\*\*\*\*\* Any course numbered EE 3XX, EE 4XX, REE 3XX, REE 4XX or courses included in the list for a specific degree option can be used as an engineering elective (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor approval.

## Bachelor of Science in Electrical Engineering (Post-Baccalaureate)

Oregon Tech Bachelor of Science in Electronics Engineering Technology graduates may complete 36 additional credits to receive a Bachelor of Science in Electrical Engineering (post-baccalaureate). Students who have completed an ABET accredited bachelor's in Electronics Engineering Technology from another institution must complete a minimum of 45 Oregon Tech credits to receive the BS in Electrical Engineering from Oregon Tech. Students pursuing this option should contact an academic advisor to draft an academic plan that ensures all BSEE curriculum requirements are met.

The following is a list of additional courses that BSEET graduates are required to complete in order to meet the BSEE degree requirements.

### Mathematics and Science

CHE 201	General Chemistry <sup>*</sup>	3
CHE 204	General Chemistry Laboratory <sup>*</sup>	1
CHE 202	General Chemistry <sup>**</sup>	3
CHE 205	General Chemistry Laboratory <sup>**</sup>	1
MATH 253N	Series and Sequences	4
MATH 341	Linear Algebra I	4
MATH 465	Mathematical Statistics	4

### Electrical Engineering

EE 341	Electricity and Magnetism with Transmission Lines	4
EE 343	Solid-State Electronic Devices	3
EE 355	Control System Design	4

### Engineering Technical Electives

Technical elective (EE, REE) <sup>***</sup>	3
Technical elective (EE, REE) <sup>***</sup>	3

**Total if prior BSEET degree awarded by Oregon Tech** **36**

Additional credits needed for students who completed a BSEET degree from another institution:

Technical elective (EE, REE) <sup>***</sup>	3
Technical elective (EE, REE) <sup>***</sup>	3
Technical elective (EE, REE) <sup>***</sup>	3

**Total** **45**

<sup>\*</sup>CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively.

<sup>\*\*</sup>CHE 202/5 can be substituted with an advisor approved 4 credit Math/Science elective.

<sup>\*\*\*</sup>Requires advisor approval.

## Concurrent Degree in Electrical Engineering and Renewable Energy Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees concurrently; a BS in Electrical Engineering & BS in Renewable Energy Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high growth discipline (Renewable Energy Engineering). The degree program will take an additional year beyond the BSEE degree program (or 4.5 years total by taking courses in Summer term). To obtain both degrees (BSEE and BSREE) students must complete all of the courses required for the BSEE degree and the following BSREE courses. Consult with your advisor for details.

CHE 202/205	General Chemistry <sup>*</sup> /Laboratory <sup>*</sup>	4
CHE 260	Electrochemistry for RE	4
ENGR 211	Engineering Mechanics: Statics	4
ENGR 355	Thermodynamics	3
MECH 318	Fluid Mechanics	4
MECH 323	Heat Transfer I	3
REE 243	Electrical Power <sup>*</sup>	4
REE 253	Electromechanical Energy Conversion	3
EE 419	Power Electronics <sup>*</sup>	4
REE 33X	REE Elective	3
REE 3XX	REE Elective	3
REE 412	Photovoltaic Systems <sup>*</sup>	3
REE 413	Electrical Power Conver. Sys.	3
REE 463	Energy System Instrumentation	3
REE 4XX	REE Elective	3
HIST 356	History of Energy <sup>*</sup>	3
or		
HIST 357	History of the Electric Grid <sup>*</sup>	3

<sup>\*</sup>Can be used to meet BSEE degree requirements

Students must complete a minimum of 36 credit hours in addition to the BSEE degree requirements in order to get a second degree.

## 4+1 BSEE/MSREE Program

Students may earn both BSEE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSEE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework. Students pursuing this option follow the standard BSEE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

### To meet BSEE requirements:

Replace 9 credits of engineering electives with one graduate-level REE sequence in Electric Power (REE 529, 549, 569) or PV Systems and Processing (REE 525, 545, 565).

Replace 3 terms of ENGR465 - Capstone Project with 3 terms of Graduate Design Project (REE 599, 599, 599)

To meet additional MSREE requirements:

Research Methods and Innovation sequence (REE 511, 512, 513)

Energy Engineering sequence (REE 515, 516, 517)

Graduate-level REE sequence (REE 5xx, 5xx, 5xx)

Graduate-level REE sequence (REE 5yy, 5yy, 5yy)

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSEE and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by both EE and REE advisors. Students should contact their academic advisors for details.



# Electronics Engineering Technology

## Degrees Offered

Bachelor of Science in Electronics Engineering Technology (Wilsonville & Portland Westside)

Electronics Engineering Technology is concerned with theory, concepts, and practice of applied electronics engineering. Emphasis is placed on the practical application of engineering knowledge. As a result, the Electronics Engineering Technology graduate possesses a combination of theoretical and practical understanding and requires minimal on-the-job training.

Oregon Institute of Technology's ABET accredited Bachelor of Science degree in Electronics Engineering Technology is conveniently offered at the Oregon Tech-Portland West Campus in order to accommodate degree seeking professionals working for high-tech companies. The West Campus is located at the heart of the high-tech industry cluster (Silicon Forest), minutes away from companies such as Intel, Tektronix, MAXIM, Credence, Lattice, Synopsis, TriQuint, and ESI. Some of the core courses for the degree and technical electives are also available online and at the Oregon Tech-Wilsonville campus.

## Career Opportunities

The program is designed to prepare graduates to assume engineering and technology positions in the electronics industry. Graduates of the Electronics Engineering Technology Program fulfill a wide range of functions within industry. Bachelor's degree graduates are currently placed in positions such as component and system design, test engineering, product engineering, field engineering, manufacturing engineering, sales or market engineering, and quality control engineering. The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management and MBAs.

Employers of Electronics Engineering Technology graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, semiconductor companies, and automated electronic controlled process-

ing companies. Recent graduates have been employed at companies such as MAXIM, Tektronix, TriQuint, MSE and Intel.

The mission of the EET Program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electronics.

The Program Educational Objectives of the BS EET program are:

1. The graduates of the program will possess a strong technical background as well as analytical and problem solving skills, and will contribute in a variety of technical roles within the electronics and high-tech industry. Within three years of graduation, BSEET graduates are expected to be employed as test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, and similar engineering technology positions within this industry.
2. The graduates of the program will be working as effective team members with excellent oral and written communication skills, assuming technical and managerial leadership roles throughout their career.
3. The graduates of the program will be committed to professional development and lifelong learning by engaging in professional and/or graduate education in order to stay current in their field and achieve continued professional growth.

## Student Preparation

The BS EET degree at Oregon Tech is designed to accommodate working professionals with evening delivery of upper-division and custom bridging courses. It is especially suited for working professionals with an associate degree in Electronics Engineering Technology, Microelectronics Technology, or equivalent coursework. Students entering the B.S. degree in Electronics Engineering Technology program by transfer are requested to contact the EET Program Director concerning transfer of technical coursework.

The BS EET program has articulation and transfer agreements with the Electronics, Microelectronics, and Renewable Energy Technology programs at various community

colleges in Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics coursework. It is recommended that students who are transferring with an AAS degree have completed Calculus II prior to transferring to the BSEET program at Oregon Tech, since Integral Calculus is a pre-requisite for most upper-division BSEET courses. We encourage students to start the advising process with Oregon Tech upon completion of the first year of their AAS degree.

## Accreditation

The Electronics Engineering Technology program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Degree Requirements

The Bachelor of Science in Electronics Engineering Technology requires 188 credit hours, taking a full-time student approximately four years to complete.

## Technical Emphases

Students in the BS EET program may choose to specialize in a particular area by selecting their technical elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts.

### 1. Electrical Power

Choose technical elective courses from the following list:

EE 419	Power Electronics	4
REE 243	Electrical Power	4
REE 253	Electromechanical Energy Conversion	4
REE 345	Wind Power	3
REE 453	Power System Analysis	3
REE 454	Power System Protection and Control	3
Or advisor approved technical electives		

### 2. Microelectronics

Choose technical elective courses from the following list:

EE 341	Electricity & Magnetism with Transmission Lines	4
EE 343	Solid State Electronic Devices	3

EE 421	Analog IC Design	5
EE 423	CMOS Digital IC Design	5
Or advisor approved technical electives		

### 3. Optoelectronics

Choose technical elective course from the following list:

EE 351	Optical Detection & Radiometry	4
EE 352	Geometric Optics	4
EE 353	Physical Optics	4
EE 451	Lasers	4
EE 452	Waveguides & Fiber Optics	4
EE 453	Optical Metrology	4
Or advisor approved technical electives		

### 4. Renewable Energy

Choose technical elective courses from the following list:

EE 419	Power Electronics	4
REE 243	Electrical Power	4
REE 253	Electromechanical Energy Conversion	4
REE 345	Wind Power	3
REE 346	Biofuels and Biomass	3
REE 412	Photovoltaic systems	3
REE 413	Electric Power Conversion Systems	3
REE 427	Green House Accounting	3
Or advisor approved technical electives		

## Bachelor of Science in Electronics Engineering Technology Curriculum

The curriculum map below shows the required courses, recommended sequence, and recommended terms during which they should be taken for students transferring into the program with an accredited AAS degree or equivalent lower division coursework (freshman and sophomore years).

Transfer students and part-time students should contact the EET program director to develop a customized curriculum tailored to their individual circumstances.

### Freshman and Sophomore Years

The degree requirements for the first two years can be fulfilled by completing an accredited Associate of Applied Science degree in Electronics Engineering Technology, Microelectronics Engineering Technology, Microelectronics Technology, Electrical Engineering Transfer, Renewable Energy Technology, or equivalent coursework. Oregon Tech has articulation agreements with various community colleges throughout Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics courses at Oregon Tech. In addition to the electronics courses, students must complete the programming, math and science, communication, and general education courses specified below during the Freshman and Sophomore years while completing their AAS degree in order to be able to complete the upper-division (Junior and Senior) BSEET courses at Oregon Tech in two years. Below is a list of courses to satisfy the requirements for the first two years of the degree. Completion of all these courses is not required to be able to transfer, but it is recommended for 2+2 transferability.

### Communication (12 credits)

SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3

### General Education (12 credits)

Humanities electives	6
Social Science electives	6

### Mathematics and Science (31 credits)

MATH 111	College Algebra	4
MATH 112	Trigonometry	4
MATH 251	Differential Calculus	4
MATH 252	Integral Calculus	4
PHY 221	General Physics with Calculus	4
PHY 222	General Physics with Calculus	4
PHY 223	General Physics with Calculus	4
	Math/Science elective	3

### Electronics (36 credits)

EET 215	Digital Circuits I	4
EET 216	Digital Circuits II	4
EET 217	Electric Circuits I	4
EET 218	Electric Circuits II	4
EET 219	Semiconductor Devices and Amplifiers	4
	200-level Technical electives*	16

### Programming (4 credits)

CST 116	C++ Programming I	4
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## Upper Division Courses

<b>Sophomore Year</b>		<b>Summer</b>
MATH 254N	Vector Calculus I	4
MATH 321	Applied Differential Equations I	4
<b>Total</b>		<b>8</b>

<b>Junior Year</b>		<b>Fall</b>
EE 320	Advanced Circuit and Systems Analysis	5
EE 321	Electronics I	5
MGT 345	Engineering Economy	3
<b>Total</b>		<b>13</b>

<b>Junior Year</b>		<b>Winter</b>
EE 323	Electronics II	5
EE 331	Digital System Des w/HDL	4
ENGR 267	Engineering Programming	3
<b>Total</b>		<b>12</b>

<b>Junior Year</b>		<b>Spring</b>
EE 325	Electronics III	5
EE 432	Advanced Digital system Design w/HDL	4
	Social Science elective	3
<b>Total</b>		<b>12</b>

<b>Junior Year</b>		<b>Summer</b>
SPE 321	Small Group and Team Communication	3
WRI 327	Advanced Technical Writing	3
	Social Science elective	3
<b>Total</b>		<b>9</b>

<b>Senior Year</b>		<b>Fall</b>
EE 333	Microcontroller Engineering	4
ENGR 465	Capstone Project	2
	Technical elective*	3
	Humanities elective	3
<b>Total</b>		<b>12</b>

<b>Senior Year</b>		<b>Winter</b>
EE 335	Adv. Microcontroller Engineering	4
EE 430	Linear Systems and Digital Signal Processing	5
ENGR 465	Capstone Project	2
	Technical elective*	3
<b>Total</b>		<b>14</b>

<b>Senior Year S</b>		<b>pring</b>
EE 401	Communication Systems	5
ENGR 465	Capstone Project	2
	Technical elective*	3
	Elective	3
<b>Total</b>		<b>13</b>

\*Any course numbered EE 3xx, EE4xx, REE 3xx, and REE 4xx or courses included in the list for a specific degree option can be used as an engineering elective(students must satisfy course pre- and co-requisites). Other courses may be used as upper-division technical electives with advisor approval.

**Total credits required for B.S.in Electronic Engineering Technology: 188**

# Renewable Energy Engineering

## Degree Offered

Bachelor of Science in Renewable Energy Engineering

Master of Science in Renewable Energy Engineering (Wilsonville)

## Program Educational Objectives

The department offers a bachelor's degree in renewable energy engineering. Graduates from this program will:

1. Excel as professionals in the various fields of energy engineering.
2. Be known for their commitment to life-long learning, social responsibility, and professional and ethical responsibilities in implementing sustainable engineering solutions.
3. Excel in critical thinking, problem solving and effective communication.

## Career Opportunities

Program graduates will enter energy careers as power engineers, PV/semiconductor processing engineers, facilities and energy managers, energy system integration engineers, HVAC and M/E/P engineers, design and modeling engineers for net-zero energy buildings, biofuels plant and operations engineers, energy systems control engineers, power electronics engineers, utility program managers, as well as renewable energy planners and policy makers. Graduates of the program will be able to pursue a wide range of career opportunities, not only within the emerging field of renewable energy, but within more traditional areas of energy engineering as well.

Employers of Renewable Energy Engineering graduates include consulting engineering firms, fuel cell manufacturers, power converter manufacturers, public utilities, government agencies, photovoltaic manufacturers, and energy developers. Recent graduates have been employed at companies such as Advanced Energy, ClearEdge Power, Jacobs Engineering, Power Engineers, and Iberdrola Renewables.

## Bachelor of Science

A Bachelor of Science in Renewable Energy Engineering, BSREE, is offered by both Oregon Institute of Technology's Wilsonville and Klamath Falls campuses. A program that accommodates both full-time and part-time

students is offered in Wilsonville. A conventional four-year, day-time delivery program is offered in Klamath Falls.

The baccalaureate renewable energy engineering degree program prepares students for the challenges of designing, promoting and implementing renewable energy engineering in society's rapidly-changing energy-related industries. Energy, in its many abundant forms, is the driving physical factor upon which industrial societies are founded. As geopolitical, environmental and geological factors act to constrain tradition resources, societies have been forced to re-think and re-develop their energy infrastructures. Renewable energy resources include solar thermal collectors, photovoltaics, ground-source heat pumps, geothermal resources, hydroelectric power, wind power, tidal and wave power, biofuels and fuel cells. Oregon Tech's Bachelor of Science in Renewable Energy Engineering prepares students for success in these rapidly developing fields.

The baccalaureate renewable energy engineering degree program is built upon a solid foundation in physics, chemistry, mathematics and communications. Added to this foundation are courses in electrical and mechanical engineering that establish a firm understanding of the fundamentals of energy. The engineering coursework prepares students for renewable energy-specific courses such as photovoltaics, wind power, biofuels, hydroelectric, fuel cells and solar thermal systems. These courses are then integrated into system-wide senior level courses such as energy system design, energy-efficient building systems, renewable energy transportation systems, energy management and energy systems control.

## Student Preparation

High school students should be prepared to start their college academic work with at least college calculus and Freshman English composition. Typically, this means the successful new student has completed:

1. Four years of high school mathematics including algebra I and II, geometry and trigonometry
2. Four years of English composition/writing
3. Four years of science including physics and chemistry

Students entering the program by transfer are requested to contact the program director for evaluation of REE-related transfer courses.

## Accreditation

The Renewable Energy Engineering baccalaureate program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Degree Requirements

The Bachelor of Science in Renewable Energy Engineering is a rigorous curriculum that requires approximately four years to complete. See the general education requirements for a bachelor's degree listed in the Academic Policies section of the catalog.

All courses listed in the curriculum for the current catalog year must be completed to be eligible for graduation, unless a student has already completed the requirements for a category that has changed. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

A minimum of 183/185 credits must be completed and students must maintain a 2.0 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all courses with MATH, CHE, PHY, EE, ENGR, MECH, and REE prefixes. Students must also earn a grade of "C" or better in all courses listed as prerequisites for these courses.

## Bachelor of Science in Renewable Energy Engineering

### Curriculum – Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 201	General Chemistry*	3
CHE 204	General Chemistry Laboratory*	1
ENGR 101	Introduction to Engineering I**	2
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
<b>Total</b>		<b>13</b>

Freshman Year		Winter
CHE 202	General Chemistry*	3
CHE 205	General Chemistry Laboratory*	1
ENGR 102	Introduction to Engineering II**	2
MATH 252	Integral Calculus	4
WRI 122	Argumentative Writing	3
	Social Science Elective	3
<b>Total</b>		<b>16</b>

Freshman Year		Spring
MATH 254N	Vector Calculus I	4
CHE 260	Electrochemistry for RE	4
ENGR 267	Advanced Eng. Programming	3
SPE 111	Public Speaking	3
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>17</b>

Sophomore Year		Fall
EE 221	Circuits I	4
MATH 321	Applied Differential Equations I	4
PHY 221	General Physics with Calculus	4
ECO 201	Principles of Economics, Microeconomics	3
Or		
ECO 202	Principles of Economics, Macroeconomics	3
<b>Total</b>		<b>15</b>

Sophomore Year		Winter
EE 223	Circuits II	4
ENGR 211	Engineering Mechanics: Statics	4
PHY 222	General Physics with Calculus	4
HIST 356	A History of Energy	3
Or		
HIST 357	History of Electrical Grid	3
<b>Total</b>		<b>15</b>

Sophomore Year		Spring
EE 225	Circuits III	4
REE 243	Electrical Power	4
PHY 223	General Physics with Calculus	4
MATH 361	Statistical Methods I	4
Or		
MATH 465	Probability and Statistics	4
<b>Total</b>		<b>16</b>

Junior Year		Fall
EE 321	Electronics I	5
MATH 341	Linear Algebra	4
MECH 318	Fluid Mechanics I	4
Or		
ENGR 318	Engineering Mechanics: Fluids	3
REE 253	Electromechanical Energy Conversions	3
	Renewable Energy Engineering elective	3
<b>Total</b>		<b>19</b>

Junior Year		Winter
REE 337	Materials for RE Applications	3
Or		
EE 343	Solid-State Electronic Devices	3
EE 355	Control Systems Design	4
ENGR 355	Thermodynamics	3
WRI 327	Advanced Technical Writing	3
	Renewable Energy Engineering elective	3
<b>Total</b>		<b>16</b>

Junior Year		Spring
MECH 323	Heat Transfer I	3
REE 331	Fuel Cells	3
EE 419	Power Electronics	4
SPE 321	Small Group and Team Communication	3
	Renewable Energy Engineering elective	3
<b>Total</b>		<b>16</b>

Senior Year		Fall
REE 339	Senior Project I	2
REE 4XX	Senior Sequence I	3
REE 412	Photovoltaic Systems	3
	Renewable Energy Engineering elective	3
	Humanities Elective	3
<b>Total</b>		<b>14</b>

Senior Year		Winter
REE 4XX	Senior Sequence II	3
REE 413	Electric Power Conversions Systems	3
REE 449	Senior Project II	2
	Renewable Energy Engineering elective	3
	Social Science elective	3
<b>Total</b>		<b>14</b>

Senior Year		Spring
REE 463	Energy Systems Instrumentation	3
REE 459	Senior Project III	2
REE 4XX	Senior Sequence III	3
	Humanities elective	3
	Humanities Elective	3
<b>Total</b>		<b>14</b>

**Total Credits Required for B.S. Renewable Energy Engineering: 185**

### Curriculum – Wilsonville Campus

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 201	General Chemistry*	3
CHE 204	General Chemistry Laboratory*	1
REE 201	Introduction to Renewable Energy	2
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
<b>Total</b>		<b>13</b>

Freshman Year		Winter
CHE 202	General Chemistry*	3
CHE 205	General Chemistry Laboratory*	1
ECO 201	Principles of Economics, Microeconomics	3
Or		
ECO 202	Principles of Economics, Macroeconomics	3
MATH 252	Integral Calculus	4
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>14</b>

Freshman Year		Spring
MATH 254N	Vector Calculus I	4
CHE 260	Electrochemistry for RE	4
SPE 111	Public Speaking	3
WRI 227	Technical Report Writing	3
	Social Science Elective	3
<b>Total</b>		<b>17</b>

Sophomore Year		Fall
EE 221	Circuits I	4
MATH 361	Statistical Methods I	4
Or		
MATH 465	Probability and Statistics	3
PHY 221	General Physics with Calculus	4
WRI 327	Advanced Technical Writing	3
<b>Total</b>		<b>15</b>

Sophomore Year		Winter
EE 223	Circuits II	4
ENGR 267	Engineering Programming	3
PHY 222	General Physics with Calculus	4
MATH 341	Linear Algebra	4
<b>Total</b>		<b>15</b>

Sophomore Year		Spring
EE 225	Circuits III	4
REE 243	Electrical Power	4
PHY 223	General Physics with Calculus	4
MATH 321	Applied Differential Equations I	4
<b>Total</b>		<b>16</b>

Junior Year		Fall
EE 321	Electronics I	5
REE 337	Materials for RE Applications	3
ENGR 211	Engineering Mechanics: Statics	4
ENGR 355	Thermodynamics	3
SPE 321	Small Group & Team Comm.	3
<b>Total</b>		<b>18</b>

Junior Year		Winter
MECH 318	Fluid Mechanics I	4
Or		
ENGR 318	Engineering Mechanics: Fluids	
REE 412	Photovoltaic Systems	3
REE 463	Energy Systems Instrumentation	3
HIST 356	A History of Energy	
Or		
HIST 357	History of Electrical Grid	3
	Humanities Elective	3
<b>Total</b>		<b>16</b>

Junior Year		Spring
EE 355	Control Systems Design	4
MECH 323	Heat Transfer I	3
ENGR 465	Capstone Project	2
REE 253	Electromechanical Energy Conversion	3
	Renewable Energy Engineering Elective	3
<b>Total</b>		<b>15</b>

Senior Year		Fall
REE 331	Fuel Cells	3
REE 4XX	Senior Sequence I	3
	Renewable Energy Engineering Elective	3
	Renewable Energy Engineering Elective	3
	Social Science elective	3
<b>Total</b>		<b>15</b>

Senior Year		Winter
ENGR 465	Capstone Project	2
EE 419	Power Electronics	4
REE 4XX	Senior Sequence II	3
	Renewable Energy Engineering Elective	3
	Humanities Elective	3
<b>Total</b>		<b>15</b>

Senior Year		Spring
ENGR 465	Capstone Project	2
REE 4XX	Senior Sequence III	3
REE 413	Electric Power Conversion Systems	3
	Renewable Energy Engineering Elective	3
	Humanities Elective	3
<b>Total</b>		<b>14</b>

**Total Credits Required for B.S. Renewable Energy Engineering: 183**

## Renewable Energy Engineering Electives

REE 333	Batteries (2-3-3)
REE 335	Hydrogen (2-3-3)
REE 337	Materials for RE Applications (3-0-3)
REE 344	Nuclear Energy (3-0-3)
REE 345	Wind Power (3-0-3)
REE 346	Biofuels and Biomass (2-3-3)
REE 347	Hydroelectric Power (3-0-3)
REE 348	Solar Thermal Energy Systems (3-0-3)
REE 307/407	Independent Study/Special Topics/Seminar (3-0-3)***
REE 427	Greenhouse Gas Accounting (3-0-3)
REE 439	Building Energy Auditing and Management (3-0-3)
REE 451	Geothermal, G-SHP (3-0-3)
REE 453	Power Systems Analysis (3-0-3)
REE 454	Power System Protection/Control (3-0-3)
REE 455	Energy Efficient Building Design (3-0-3)
REE 465	RE Transportation Systems (3-0-3)
REE 469	Grid Integration of RE (3-0-3)
EE 341	Electricity and Magnetism with Transmission Lines (4-0-4)
EE 347	Digital Logic (3-3-4)
EE 343	Solid State Electronic Devices (3-0-3)
MECH 433	HVAC (3-0-3)

\*CHE201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively.

\*\*With advisor approval students may take REE 201 in place of ENGR 101 and ENGR 102.

\*\*\*Course may be repeated multiple times for credit with advisor approval.

## Senior Sequences:

Students are required to complete a minimum of one sequence (all three courses) from the list below:

Green Building: MECH 433, REE 439 and REE 455  
 Power Systems: REE 453, REE 454 and REE 469  
 Geothermal: REE 407, REE 451 and REE 407

## Concurrent Degree in Environmental Sciences

Renewable Energy Engineering students have the opportunity to earn concurrent degrees in Renewable Energy Engineering and Environmental Sciences. The additional degree requires 49 credits in Environmental Sciences courses, which can be taken concurrent to Renewable Energy Engineering courses or an add-on year. A second degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Renewable Energy Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Renewable Energy Engineering.

BIO 111	Introduction to Environmental Sciences	4
BIO 211	Principles of Biology	4
BIO 212	Principles of Biology	4
BIO 213	Principles of Biology	4
ENV 225	Riparian Assessment Methods	1
BIO 327	General Ecology	4
BIO 434	Data Analysis Methods	
or		
MATH 362	Statistical Methods II	4
BIO 484	Sustainable Human Ecology	4
CHE 223	General Chemistry*	5
CHE 235	Streamwater Chemistry and Sampling	3
CHE 331	Organic Chemistry I	4
ENV 314	Environmental Management and Restoration	3
GEOG 105	Physical Geography: Geomorphology	3
GIS 105	Map and Compass/GPS	1
GME 134	Geographic Information Systems	3
	Chemistry Technical Emphasis elective**	3

\* CHE 223 should be taken as the Renewable Energy Engineering required Math/Science elective.

\*\* This technical emphasis elective must have a CHE prefix; different courses are offered every year.

## Concurrent Degree in Electrical Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees concurrently; a BS in Renewable Energy Engineering and a BS in Electrical Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high-growth discipline (Renewable Energy Engineering). The degree program will take an additional year beyond the BSREE degree program (or 4.5 years total by taking courses in Summer term). To obtain both degrees (BSREE and BSEE) students must complete all of the courses required for the BSREE degree and the following BSEE courses. Consult with your advisor for details.

MATH 253N Sequences and Series	4
MATH 465 Mathematical Statistics*	4
CST 116 C++ Programming	4
EE 323 Electronics II	5
EE 331 Digital System Design w/HDL	4
EE 333 Microcontroller Eng.	4
EE 341 Electricity and Magnetism with Transmission Lines**	4
EE 343 Solid State Electronic Devices***	3
EE 347 Digital Logic****	4
EE 430 Linear Systems & DSP	5
EE XXX EE Elective*****	4
MGT 345 Engineering Economy	3

\*Students should substitute MATH465 for MATH361 in BS REE curriculum

\*\*EE341 can be used as a REE elective

\*\*\*Can be used to meet BSREE degree requirements

\*\*\*\*Students can substitute EE131/133 sequence

\*\*\*\*\*Students can select between EE325, EE335, or an advisor-approved upper-division EE elective

Students must complete a minimum of 36 credit hours in addition to the BSREE degree requirements in order to get a second degree.

## 4+1 BSREE/MSREE Program

Students may earn both BSREE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSREE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework. Students pursuing this option follow the standard BSREE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSREE requirements:

Replace 9 credits of REE senior sequence with one graduate-level REE sequence.

Replace 3 terms of ENGR465 - Capstone Project with 3 terms of Graduate Design Project (REE 599, 599, 599).

To meet additional MSREE requirements:

Research Methods and Innovation sequence (REE 511, 512, 513)

Energy Engineering sequence (REE 515, 516, 517)

Graduate-level REE sequence (REE 5xx, 5xx, 5xx)

Graduate-level REE sequence (REE 5yy, 5yy, 5yy)

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSREE and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by an REE advisor. Students should contact their academic advisors for details.

## The Master of Science in Renewable Energy Engineering (MSREE)

The Master of Science in Renewable Energy Engineering (MSREE) program is offered at Oregon Tech-Wilsonville campus. The MSREE program accommodates both full-time students and working professionals. The program is designed to prepare graduates to be energy engineering professionals who have advanced knowledge and skills that enable them to assume a broad range of technical leadership roles.

The MSREE curriculum is built upon core tracks in research methods & innovation and advanced energy engineering. These courses provide the foundation for three required specialized course sequences in renewable energy technologies and nine credits of thesis or graduate R&D project work.

### Student Preparation

Students should be prepared to start graduate academic work. Typically, this means the successful new student has the following:

1. a baccalaureate degree in engineering, the physical sciences (e.g., physics, chemistry), or a related technical discipline
2. evidence of potential for graduate academic work, success or potential for success in industry, and demonstrated interest in energy engineering

### Accreditation

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

### Master of Science Degree Requirements

The Master of Science in Renewable Energy Engineering is a rigorous curriculum that requires 54 credit hours and approximately two years to complete.

## Curriculum

Required courses and recommended terms during which they should be taken:

<b>First Year</b>		<b>Fall</b>
REE 511	Research Methods & Innovation I	3
REE 515	Energy Engineering I	3
REE 5xx	REE Specialization Sequence X: Course 1 of 3	3
<b>Total</b>		<b>9</b>

<b>First Year</b>		<b>Winter</b>
REE 512	Research Methods & Innovation II:	3
REE 516	Energy Engineering II	3
REE 5xx	REE Specialization Sequence X: Course 2 of 3	3
<b>Total</b>		<b>9</b>

<b>First Year</b>		<b>Spring</b>
REE 513	Research Methods & Innovation III:	3
REE 517	Energy Engineering III	3
REE 5xx	REE Specialization Sequence X: Course 3 of 3	3
<b>Total</b>		<b>9</b>

<b>Second Year</b>		<b>Fall</b>
REE 599	Graduate Research or Project	3
REE 5yy	REE Specialization Sequence Y: Course 1 of 3	3
REE 5zz	REE Specialization Sequence Z: Course 1 of 3	
or		
	Elective	3
<b>Total</b>		<b>9</b>

<b>Second Year</b>		<b>Winter</b>
REE 599	Graduate Research or Project	3
REE 5yy	REE Specialization Sequence Y: Course 2 of 3	3
REE 5zz	REE Specialization Sequence Z: Course 2 of 3	
or		
	Elective	3
<b>Total</b>		<b>9</b>

<b>Second Year</b>		<b>Spring</b>
REE 599	Graduate Research or Project	3
REE 5yy	REE Specialization Sequence Y: Course 3 of 3	3
REE 5zz	REE Specialization Sequence Z: Course 3 of 3	
or		
	Elective	3
<b>Total</b>		<b>9</b>

**Total Credits Required for M.S. Renewable Energy Engineering:** 54



# Geomatics Department

Jack Walker, *Department Chair*

*Professors:* J. Ritter, J. Walker

*Associate Professor:* M. Marker

*Assistant Professor:* M. Duryea

*Wilsonville Program Director:* T. Kent

## Degree Offered

Bachelor of Science in Geomatics with options in:

Surveying

Geographic Information Systems

## Minors Offered

Geographic Information Systems

Surveying

Geomatics is the modern scientific term referring to an integrated approach to the measurement, analysis and management of spatial data. Geomatics employs advanced technologies such as Geographic Information Systems (GIS), the Global Positioning System (GPS), digital photogrammetry, digital total stations, and satellite remote sensing to create a detailed but understandable picture of the Earth's physical features and the built environment. Geomatics encompasses disciplines that depend on geo-referenced spatial data, including surveying, engineering, cartography, land information management, geodesy, and remote sensing.

Students within the Geomatics Program must choose between either an option in Surveying or Geographic Information Systems (GIS). Students may, with consent of their advisor, complete both options.

## Program Objectives

Graduates of the Oregon Tech Geomatics options will:

1. Acquire the ability to obtain professional licensure and/or certifications in the geospatial industry.
2. Advance in the geospatial industry during their career by becoming involved in local, state, national, or international professional organizations.

3. Obtain industry positions requiring increased responsibility.
4. Assume responsibility for lifelong learning in professional and personal development.
5. Demonstrate readiness for graduate education and/or advanced technical education.

## Student Preparation

It is recommended that students prepare for entrance into the program by emphasizing mathematics and science in high school.

Two years of algebra and one year each of geometry, trigonometry and physics are desirable prerequisites. Students lacking this preparation typically require additional time for degree completion.

## Degree Requirements

A minimum of 181 term hours must be completed for the Surveying option, of which 80 term hours must be in the GIS and geomatics area. A minimum of 181 term hours must be completed for the GIS option, of which 74 term hours must be in the GIS and geomatics area.

## Bachelor of Science in Geomatics, Surveying Option

The department offers a nationally-recognized professional degree program that prepares students for employment within the geomatics profession and licensure as a Professional Land Surveyor (PLS). Students enjoy small classes taught by licensed professionals that emphasize fundamental theory and problem solving in a computer-intensive curriculum. Field laboratory experiences integrated throughout the curriculum provide practical skills, and offer extensive opportunities to prepare students to work in teams using state-of-the-art technology. Upon completing the freshman year, students often have sufficient experience to obtain summer employment as a survey crew member.

Completion of the program qualifies graduates to take the Fundamentals of Surveying (FS) exam during the spring term of the senior year. The broad-based nature of the curriculum ensures that graduates will be prepared to fulfill both the traditional and contemporary roles of the profession. The program rigor is similar to a traditional engineering program; however, geomatics courses replace the traditional engineering core subjects.

## Cooperative Education

Geomatics students may, upon completion of the freshman year, apply for student career experience programs (SCEP) with the U.S. Bureau of Land Management, Bonneville Power Administration, U.S. Forest Service, or other appropriate employers. Work experiences are paid and may be for three or six month periods. Students may earn two or four credits for work experience periods. A maximum of four credits may be applied toward the bachelor's degree.

Geomatics students are also eligible for the Civil Engineering Cooperative Program (CE-COP), offering high-quality, paid industrial experience and related academic activities while students pursue their degree. The Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) counts this internship time toward PLS licensure requirements.

## Scholarships

Approximately 40 scholarships are available to geomatics students each year through CLSA, PLSO, LSAW, WESTFED, ACSM, and other organizations. BLM SCEP students may be eligible for additional funding to cover books and tuition.

## Career Opportunities

The employment forecast for graduates in this field is exceptional. As an increasing number of licensed surveyors across the nation retire, a personnel shortage has been created within the geomatics profession. Graduates are prepared for a wide variety of career opportunities in the fields of surveying, engineering, construction, remote sensing, GIS, and land information management. Geomatics provides the opportunity to work primarily outdoors, exclusively in an office, or in some combination of the two. Geomatics attracts individuals who enjoy working outdoors, as well as those who enjoy working indoors with computers, advanced technology, and high-tech instruments.

## Accreditation

The Geomatics Program (surveying option) is accredited by the Applied Science Accreditation Commission (ASAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Bachelor of Science in Geomatics, Surveying Option

### Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>
GME 161	Plane Surveying I	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Social Science elective	3
<b>Total</b>		<b>14</b>

<b>Freshman Year</b>		<b>Winter</b>
CE 203	Engineering Graphics	3
GME 175	Computations and Platting	4
MATH 251	Differential Calculus	4
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>14</b>

<b>Freshman Year</b>		<b>Spring</b>
GME 134	Geographic Information Systems	3
GME 162	Plane Surveying II	4
MATH 252	Integral Calculus	4
SPE 111	Public Speaking	3
<b>Total</b>		<b>14</b>

<b>Sophomore Year</b>		<b>Fall</b>
GME 163	Route Surveying	5
GME 241	Boundary Law I	3
MATH 254	Vector Calculus I	4
PHY 221	General Physics with Calculus	4
<b>Total</b>		<b>16</b>

<b>Sophomore Year</b>		<b>Winter</b>
GME 242	Land Descriptions and Cadastre	3
GME 264	Digital Design for Surveying	2
PHY 222	General Physics with Calculus	4
WRI 227	Technical Report Writing	3
	Social Science elective	3
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Spring</b>
GME 372	Subdivision Planning and Platting	4
MATH 361	Statistical Methods I	4
MIS 275	Introduction to Relational Databases	3
PHY 223	General Physics with Calculus	4
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Fall</b>
GME 343	Boundary Surveys	4
MIS 118	Programming Fundamentals	4
WRI 327	Advanced Technical Writing	3
	Social Science elective	3
GME 355	Digital Photogrammetry	3
<b>Total</b>		<b>17</b>

<b>Junior Year</b>		<b>Winter</b>
GIS 316	Geospatial Vector Analysis I	4
GME 466	Boundary Law II	2
SPE 321	Small Group and Team Communication	3
	GME/GIS elective	4
	Math elective*	3
<b>Total</b>		<b>16</b>

<b>Junior Year</b>		<b>Spring</b>
BUS 226	Business Law	3
GME 351	Construction and Engineering Surveying	4
GME 444	Adjustment by Least Squares	4
MGT 345	Engineering Economy	3
	Humanities elective	3
<b>Total</b>		<b>17</b>

<b>Senior Year</b>		<b>Fall</b>
GME 425	Remote Sensing	4
GME 451	Geodesy	4
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>14</b>

<b>Senior Year</b>		<b>Winter</b>
GME 434	Land Administration for Sustainability	4
GME 452	Map Projections	3
GME 454	GNSS Surveying	4
	Science elective	4
<b>Total</b>		<b>15</b>

<b>Senior Year</b>		<b>Spring</b>
GME 468	Geomatics Practicum	4
	Business elective (upper-division)**	3
	Humanities elective	3
	Science elective	4
<b>Total</b>		<b>14</b>

\* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

\*\* BUS 304 or BUS 356 recommended.

Note: Humanities and Social Science electives must be approved by the department.

**Total credits required for B.S. in Geomatics, Surveying Option:** **181**

## Bachelor of Science in Geomatics, Geographic Information Systems (GIS) Option

Geographic Information Systems (GIS) is a systematic approach to the management, analysis, and display of geographic information. Although the management of such information often times requires the application of advanced RDBMS techniques, the ability to see a project through to completion requires fundamental project management skills as well. The analysis of geodatasets is predicated on a firm understanding of spatial reference/coordinate systems, topological relationships, and statistical methods. Techniques for displaying geographic information take various forms such as maps, geographic datasets, and data models. Students graduating from this course of study will understand how to manipulate geographically based data in order to solve geospatial problems.

Students learn in a project-based environment how to manage the flow of data through the project in terms of data acquisition, processing, analysis, and presentation. Within the GIS option, students are able to select individual areas of focus based on independent study and/or online courses.

## Career Opportunities

The list of opportunities for students in the field of GIS has been, and is continuing to show substantial growth. As our society becomes more data centered, the importance of understanding the spatial location of this data and its spatial relationship to other data is becoming increasingly apparent. Understanding such geospatial relationships is fundamental to areas such as health care, land records management, transportation modeling, environmental engineering/science, and urban planning, to name only a few. Local, state, and federal agencies are embracing GIS more each year as these agencies realize that GIS is the appropriate tool to solve long-standing geospatial problems. Private industry is also embracing GIS since it can be used to streamline delivery and/or response routes. Both private and public entities have also realized that GIS provides an excellent decision support framework structure.

## Bachelor of Science in Geomatics, Geographic Information Systems (GIS) Option Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>
GIS 103	The Digital Earth	2
GME 161	Plane Surveying I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
<b>Total</b>		<b>13</b>

<b>Freshman Year</b>		<b>Winter</b>
CE 203	Engineering Graphics	3
GIS 105	Map and Compass/GPS	1
GME 175	Computations and Platting	4
MATH 112	Trigonometry	4
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>15</b>

<b>Freshman Year</b>		<b>Spring</b>
GME 134	Geographic Information Systems	3
GME 162	Plane Surveying II	4
MATH 251	Differential Calculus	4
SPE 111	Public Speaking	3
<b>Total</b>		<b>14</b>

<b>Sophomore Year</b>		<b>Fall</b>
GIS 306	Geospatial Raster Analysis	4
GME 241	Boundary Law I	3
MATH 252	Integral Calculus	4
PHY 221	General Physics with Calculus	4
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Winter</b>
GME 242	Land Descriptions and Cadastre	3
GIS 316	Geospatial Vector Analysis I	4
MATH 254N	Vector Calculus I	4
PHY 222	General Physics with Calculus	4
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Spring</b>
GIS 426	Geospatial Vector Analysis II	4
MATH 361	Statistical Methods I	4
MIS 275	Introduction to Relational Databases	3
PHY 223	General Physics with Calculus	4
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Fall</b>
GIS 446	GIS Database Development	4
MIS 118	Programming Fundamentals	4
MIS 341	Relational Database Design I	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Winter</b>
GIS 205	GIS Data Integration	2
GIS 332	Customizing the GIS Environment I	4
SPE 321	Small Group and Team Communication	3
	Math elective*	3
	Social Science elective	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Spring</b>
BUS 226	Business Law	3
GIS 432	Customizing the GIS Environment II	4
MGT 345	Engineering Economy	3
	Social Science elective	3
	Social Science elective	3
<b>Total</b>		<b>16</b>

<b>Senior Year</b>		<b>Fall</b>
GME 425	Remote Sensing	4
GME 451	Geodesy	4
WRI 327	Advanced Technical Writing	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

<b>Senior Year</b>		<b>Winter</b>
GIS 456	GIS Management	3
GME 452	Map Projections	3
GME 455	GNSS Surveying for GIS	4
	Humanities elective	3
	Science elective	4
<b>Total</b>		<b>17</b>

<b>Senior Year</b>		<b>Spring</b>
GME 468	Geomatics Practicum	4
	Business elective (upper-division)**	3
	Humanities elective	3
	Science elective	4
<b>Total</b>		<b>14</b>

\* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

\*\* BUS 304 or BUS 356 recommended.

Note: Humanities and Social Science electives must be approved by the department.

*Total credits required for B.S. in Geomatics, Geographic Information Systems Option:*

181

## Geographic Information Systems Minor

The Geographic Information Systems (GIS) minor is open to all majors and is especially recommended for students majoring in Geomatics (Surveying Option), Environmental Sciences, Business/Management/ Information Systems, Computer Software Engineering, Renewable Energy Engineering and Health Care. The minor provides the essential kernel of knowledge and skill necessary to approach geospatial issues pertaining to these disciplines. An advisor in the Geomatics Department must approve any substitution of courses from those listed. Preparation for this course of study entails a functional level of computer literacy that can be evaluated in consultation with an advisor. Students must also have successfully completed MATH 111 prior to enrolling in upper-division classes.

The Minor in Geographic Information Systems (GIS) acknowledges the achievement of 21 credits taken from the following GIS course listing.

### Requirements of Minor

GIS 103	The Digital Earth	2
GME 134	Geographic Information Systems	3

### Elective Courses: 16 credits required

GIS 306	Geospatial Raster Analysis	4
GIS 316	Geospatial Vector Analysis I	4
GIS 332	Customizing the GIS Environment I	4
GIS 407	GIS Practicum	4
GIS 426	Geospatial Vector Analysis II	4
GIS 432	Customizing the GIS Environment II	4
GIS 446	GIS Database Development	4

## Surveying Minor

The Surveying minor is open to all engineering majors, and is especially recommended for students majoring in Civil Engineering and Geomatics (GIS option). The minor provides the essential knowledge and skills which meet OSBEELS requirements (OAR 820-010-0226) allowing engineering students to sit for the Fundamentals of Surveying (FS) examination, and pursue licensure as a Professional Surveyor (PS). An advisor in the Geomatics Department must approve substitution of courses from those listed.

The Minor in Surveying acknowledges the achievement of 27 credits taken from the following geomatics course listing.

## Requirements of Minor

GME 134	Geographic Information Systems <sup>3</sup>	3
GME 162	Plane Surveying <sup>3,4</sup>	4
GME 241	Boundary Law <sup>3</sup>	3
GME 242	Legal Descriptions & Cadastre <sup>3</sup>	3
GME 264	Digital Design for Surveying <sup>1</sup>	3
GME 343	Boundary Surveys	4

### Elective Courses: 8 credits required

GME 163	Route Surveying	5
GME 351	Construction and Engineering Surveying <sup>2</sup>	4
GME 372	Subdivision Planning and Platting	4
GME 425	Remote Sensing <sup>3</sup>	4
GME 444	Adjustment by Least Squares	4
GME 451	Geodesy <sup>3</sup>	4
GME 452	Map Projections <sup>3</sup>	3
GME 455	GNSS Surveying <sup>3</sup>	4
GME 466	Boundary Law II	2

### Notes:

<sup>1</sup> CIV 415 will substitute for GME 264.

<sup>2</sup> CE 351 will substitute for the GME 163 prerequisite.

<sup>3</sup> Required course for GIS majors.

<sup>4</sup> MATH 221 will substitute for the GME 175 prerequisite.

# Humanities and Social Sciences Department

Mark Neupert, *Department Chair*

Alishia Huntoon, *Program Director, Extern  
Coordinator and Curriculum Coordina-  
tor, Applied Psychology*

Maria Lynn Kessler, *Applied Psychology*

*Professors:* M. Clark, M. Kessler, M.  
Neupert

*Associate Professor:* A. Huntoon,

*Assistant Professors:* J. Becnel, R. Madden,  
S. Nathenson

## Degrees Offered

Bachelor of Science in Applied Psychology

## Minors Offered

International Relations

Medical Sociology

Psychology

## Module Offered

Oregon Transfer (OTM)

The Humanities and Social Sciences Department offers a wide variety of classes that meet the general education requirements for all students. In addition, these classes meet the lower-division requirements for college transfer students in many pre-professional programs.

## Department Goals and Objectives

1. To provide coursework in the humanities and social sciences in order to prepare students for employment in a rapidly changing global market.
2. To provide course offerings in multiculturalism and globalization.
3. To assist students in developing critical thinking and problem-solving abilities and to develop scientific knowledge and inquiry skills.
4. To assist students in developing ethical and cultural awareness.
5. To prepare students to be responsible citizens and lifelong learners.
6. To assist students in developing an aesthetic appreciation of the arts.

## International Relations Minor

The International Relations Minor provides an interdisciplinary grounding in the political, economic, and cultural factors that influence human activities across national boundaries in today's changing global environment. The minor offers integrated courses in social science, humanities, business, and communications.

This Oregon Tech offering is based upon certain academic studies and employer recommendations for the basic preparation of students seeking careers with multinational corporations, banking, the U.S. government, international organizations, and the media. The minor prepares students, both technical and non-technical, for positions that require a basic understanding of international politics and business, intercultural communication, and global cultural diversity.

Enrollment in the minor is through the Humanities and Social Sciences Department. For more information, contact the department chair or your advisor.

## Requirements of the Minor

### Required lower-division courses (6 credits):

COM 205 Intercultural Communication  
PSCI 250 Introduction to World Politics

### Lower-division electives (3 credits)

Select one of the following:  
GEOG 106 Cultural Geography I  
GEOG 107 Cultural Geography II  
GEOG 108 Cultural Geography III

### Required upper-division courses (9 credits)

PSCI 326 World Politics in Transition  
PSCI 355 International Conflict in the 20th Century  
PSCI 497 United States Foreign Policy

### Upper-division electives (6 credits)

Select any two of the following:  
ANTH 452 Globalization  
BUS 308 Principles of International Business  
COM 320 Advanced Intercultural Communication  
ENG 381 Contemporary World Literature  
HIST 392 Modern Asia

All courses must be completed with grade "C" or better.

## Medical Sociology Minor

The Department of Humanities and Social Sciences offers a Medical Sociology Minor as a supplement to the Oregon Tech technical and applied degrees related to health, health care, management and social science. The minor offers courses covering the central topics of medical sociology, including the social factors in health and illness, the patient experience of illness, the role of health care professionals, and the interaction between health and society. The minor provides education on health inequality and cultural competency, as well as basic methods in demography used to analyze the health and behavior of large populations. Students learn about the interpersonal dynamics of health and health care, as well as broad trends in health and health inequality on a global level. The central goal of the Medical Sociology Minor is to serve students from all majors by enhancing their understandings of health and wellbeing in society.

The Medical Sociology Minor is designed with the current employer demands and changes in health care organization in mind. Many employers within the health care field seek employees who are culturally competent, prepared to work with diverse populations, and demonstrate leadership and social skills. Additionally, many professional organizations emphasize the social aspects of health and disease prevention and the development of community-level interventions.

A minimum of 21 credits is required to complete the minor. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

### Required lower-division courses

SOC 204 Introduction To Sociology\*  
SOC 225 Medical Sociology  
SOC 305 Rural Health or SOC 325 Global Population Health  
SOC 335 Health Inequality and Cultural Competency

**In addition, students will select three courses from the following list. Two of the three courses must be 300 or 400 level.**

BIO 200	Medical Terminology
BUS 316	Total Quality in Health Care
COM 225	Interpersonal Communication
COM 345	Organizational Communication
COM 346	Health Communication
MIS 217	Health Care Systems and Policy
SOC 305	Rural Health
SOC 325	Global Population Health
STAT 414	Statistical Methods in Epidemiology
PSY 202	Psychology
PSY 308	Psychology of Eating
PSY 330	Social Psychology
PSY 336	Health Psychology I
PSY 371	Human Sexuality I
PSY 372	Human Sexuality II

SOC or PSY 307/407 will be considered as electives pending department approval.

\*Students are not required to take SOC 204 before taking SOC 225

### Psychology Minor

The psychology minor is open to all majors and is especially recommended for students majoring in allied health and medical sciences, management, and communication studies. The minor offers a variety of courses in psychology that can enhance knowledge. A minimum of 24 credits is required to complete the minor. Students should meet with a psychology advisor when choosing electives to fulfill the minor requirements. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

### Requirements of the Minor

1. A minimum of 24 credits is required to earn the minor.
2. A minimum of 12 credits must be selected from upper-division coursework. Students must pay strict attention to prerequisite requirements.
3. Courses
  - Required lower division courses (9 credits):
    - PSY 201 Psychology
    - PSY 202 Psychology
    - PSY 203 Psychology
  - Additional Courses:
    - 12 credits of upper division psychology courses
    - 3 credits of lower or upper division courses
4. For all courses counted toward the Minor in Psychology, a letter grade of "C" or better is required to be awarded the minor.
5. At least 12 credits of courses in this minor must be completed at Oregon Tech.

Note: Not all courses are offered every term or every year.

# Applied Psychology

Alishia Huntoon, *Program Director*

Alishia Huntoon, *Externship Coordinator*

*Participating Faculty:* A. Huntoon, M. Kesler J. Becnel

## Degree Offered

Bachelor of Science in Applied Psychology

The Bachelor of Science in Applied Psychology prepares students for careers that apply the principles of psychology in diverse settings. Three emphasis areas are provided. The human services emphasis focuses on preparing students for working with human service agencies and related fields. The second emphasis area is pre-education. Students in this emphasis are prepared through the careful selection of courses to enter graduate programs in education. They may choose to focus on elementary, special, school counseling, or secondary education with an emphasis in social sciences. An emphasis on psychology applied to business (organizational development) focuses on issues relative to management within organizations, management of organizational change and organizational development. Students should consult with their advisor about their interests. Through the use of seminars, externships, and senior projects, students may prepare themselves for exciting and rewarding careers related to psychology, or for additional coursework in graduate programs.

## Mission Statement

The mission of the Applied Psychology Program is to enable students to apply general knowledge of psychology and in depth knowledge and skill in specific areas of psychology to communicate effectively, think critically, behave ethically and with cultural awareness, and work interpersonally with people from a wide variety of backgrounds.

## Career Opportunities

Nationwide, college graduates with a bachelor's in psychology perform a wide variety of jobs or attend a wide variety of graduate programs. Graduates eventually work in counseling, education, social service, management, public relations, personnel, sales, and other fields. All of these jobs are potentially available to graduates of Oregon Tech's Applied Psychology Program. Many of Oregon Tech's applied psychology graduates have found jobs in the Klamath Basin. Human service employers include county and state agencies, as well as a wide range of private, non-profit agencies.

Human service graduates benefit from the unique focus of Oregon Tech's Applied Psychology Program with its emphasis on hands-on applied training. Other graduates complete the Master of Arts in Teaching (MAT) Program and pursue careers in education. Most pursue teaching in the K-6th grades, but some have pursued careers in school counseling, special education, or secondary teaching. Graduates have also been employed in industry and are following management training programs. Finally, graduates have also pursued various master's and doctoral programs in psychology and related fields.

## Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Applied Psychology. A total of 181 credits are required for the degree. Students must complete a core program consisting of 33 credits; these core courses are PSY 201, PSY 202, PSY 203, PSY 215, PSY 216, PSY 301, PSY 313, PSY 330, PSY 331, and MATH 243 or MATH 361. In addition, students must complete an emphasis area (listed below). **Credits taken for externship or senior project do not count toward the emphasis.** Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

## Emphasis Requirements

**Students completing the Human Services emphasis must complete the following courses:**

PSY 220	Community Psychology
PSY 334	Behavior Modification I
PSY 335	Behavior Modification II
PSY 339	Biopsychology
PSY 341	Psychoactive Drugs I: Psychiatric Drugs
PSY 342	Psychoactive Drugs II: Abused Drugs

Plus four credits of psychology or sociology electives by advisement.

**Students completing the Organizational Development track must complete the following courses:**

PSY 347	Organizational Behavior
PSY 360	Organizational Psychology
PSY 361	Industrial Psychology
PSY 410	Organizational Change and Development

Plus twelve credits of psychology, business, or technology electives by advisement.

**Students completing the Pre-Education track must complete the following courses:**

PSY 311	Human Growth and Development I
PSY 312	Human Growth and Development II
PSY 334	Behavior Modification I
PSY 335	Behavior Modification II
PSY 416	Abnormal Behavior of Children and Adolescents

**Plus seven credits of psychology electives by advisement.**

Students in the Pre-Education track must consult closely with their advisor in the selection of elective courses to complete prerequisite courses for their desired endorsement area.

## Bachelor of Science in Applied Psychology Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
PSY 201	Psychology	3
WRI 121	English Composition	3
	Humanities elective	3
	Electives	6
<b>Total</b>		<b>15</b>

Freshman Year		Winter
MATH 105	Collegiate Mathematics or	
MATH 111	College Algebra	4
PSY 202	Psychology	3
WRI 122	Argumentative Writing	3
	Humanities elective	3
	Elective	3
<b>Total</b>		<b>16</b>

Freshman Year		Spring
PSY 203	Psychology	3
SPE 111	Public Speaking	3
	Communication elective*	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>15</b>

Sophomore Year		Fall
PSY 215	Abnormal Psychology I	3
SPE 321	Small Group and Team Communication	3
	Humanities or elective	3
	Laboratory Science elective	4
	Social Science elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Winter
PSY 216	Abnormal Psychology II	3
	Humanities or electives	6
	Laboratory Science elective	4
	Social Science elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Spring
MATH 243	Introductory Statistics or	
MATH 361	Statistical Methods I	4
	Emphasis elective**	3
	Laboratory Science elective	4
	Social Science elective	3
<b>Total</b>		<b>14</b>

Junior Year		Fall
PSY 301	Basic Counseling Techniques	4
PSY 313	Psychological Research Methods I	4
	Communication elective*	3
	Emphasis elective**	3
<b>Total</b>		<b>14</b>

Junior Year		Winter
PSY 330	Social Psychology I	3
	Emphasis electives**	9
	Elective	3
<b>Total</b>		<b>15</b>

Junior Year		Spring
PSY 331	Social Psychology II	3
	Emphasis electives**	9
	Elective	3
<b>Total</b>		<b>15</b>

Senior Year		Fall
	Externship*** or electives*	15
<b>Total</b>		<b>15</b>

Senior Year		Winter
	Externship*** or electives*	15
<b>Total</b>		<b>15</b>

Senior Year		Spring
	Externship*** or electives*	15
<b>Total</b>		<b>15</b>

\* See advisor for appropriate courses.

\*\* To complete their emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives.

\*\*\* No more than 32 credits of externship allowed for graduation without departmental approval.

### Emphasis Electives

#### Human services emphasis:

PSY 220, PSY 334, PSY 335, PSY 339, PSY 341, PSY 342, plus four credits of psychology or sociology electives by advisement.

#### Organization development emphasis:

PSY 347, PSY 360, PSY 361, PSY 410, plus twelve credits of psychology, business, or technology electives by advisement.

#### Pre-Education emphasis:

PSY 311, PSY 312, PSY 334, PSY 335, PSY 416, plus seven credits of psychology electives by advisement

**Total credits required for B.S.in Applied Psychology:**  
181

## Oregon Transfer Module (OTM)

The Oregon Transfer Module (OTM) provides a one-year curriculum for students who plan to transfer to a State of Oregon community college or university. The module allows students to complete one year of general education foundation course work that is academically sound and will meet the admission standards of the receiving school. Students should work closely with an academic advisor to ensure selection of appropriate course work. Upon transfer, students may be required to complete additional course work in general education or an academic major specific to the receiving institution. Students who transfer prior to the completion of the Oregon Transfer Module will have their courses individually evaluated by the receiving institution. Students must complete a minimum of 45 credits of lower division course work with a grade of "C-" or better in order to receive credit for the Oregon Transfer Module. A minimum of 12 credits must be earned at Oregon Tech. The following courses may be used to complete the Oregon Transfer Module:

### FOUNDATIONAL SKILLS

#### Writing and Oral

#### Communication

##### Writing

Two courses of college level composition

##### Oral Communication

One course of Public Speaking or communication

##### Mathematics

One course of College level Math

### INTRODUCTION TO DISCIPLINES

#### Arts and Letters/Humanities

3 courses of Arts and letters/Humanities  
*Oregon Tech only allows 3 credits of performance or studio-based courses in this category*

#### Science/Math/Computer Science

3 courses, including at least one biological or physical science with a laboratory

#### Social Science

Three courses of Social Science



# Management Department

Marla Miller, *Department Chair, Program Director and Curriculum Coordinator Health Care Management*

Grant Kirby, *Program Director and Curriculum Coordinator, Information Technology*

Hallie Neupert, *Program Director and Curriculum Coordinator, Entrepreneurship/Small Business Management and Marketing*

Pat Schaeffer, *Program Director and Curriculum Coordinator, Operations Management*

Maureen Sevigny, *Program Director, Management Distance Education, Program Director and Curriculum Coordinator, BAS Technology and Management*

Richard Bailey, *Curriculum Coordinator, Accounting*

*Professors:* R. Bailey, C. Jones, M. Miller, H. Neupert, M. Sevigny

*Associate Professors:* G. Kirby, C. Morgan

*Assistant Professors:* M. Ahalt, S. Bailey, D. DaSaro, J. Dickson, J. Jackson, M. Kirshner, B. Raffaely, P. Schaeffer

## Degrees Offered

Bachelor of Science in Health Care Management (formerly Allied Health Management), with options in:

- Administration
- Clinical Management
- Radiologic Science Management

Bachelor of Science in Information Technology, with options in:

- Accounting
- Applications Development
- Business/Systems Analysis
- Health Informatics

Bachelor of Science in Management, with options in:

- Accounting
- Entrepreneurship/Small Business Management
- Marketing

Bachelor of Science in Operations Management

Bachelor of Applied Science in Technology and Management

## Minors Offered

- Business
- International Business
- Information Technology

## Specializations Offered

- Accounting
- Entrepreneurship/Small Business Management
- Marketing
- Travel and Tourism

## Certificate Offered

- Accounting (post-baccalaureate)

## Emphasis Offered

- Six Sigma Green Belt Certification
- Renewable Energy Emphasis

The Management Department prepares students to take their place as leaders and managers in contemporary public and private organizations. Faculty in this department have been selected for their managerial experience and expertise in a diverse array of production and service industries.

Coursework in the Management programs builds upon a fundamental core of courses including management, marketing, accounting, finance, information systems, economics, ethics, organizational behavior, business law and presentations. These courses, along with program-specific courses, prepare students for their senior year which includes a senior project sequence and a capstone course.

As a result of this unique combination of resources and coursework, the Management Degree Programs remain vital and up-to-date, providing students with the technical tools of management and interpersonal skills that employers most desire. Equally important, each graduate will be ready to perform as an effective citizen in a culturally diverse, global work place.

## Department Outcomes

Management Department graduates will:

1. Demonstrate an understanding of the functional areas of accounting, marketing, finance, management and economics.

2. Demonstrate an understanding of the legal and social environment of business.
3. Demonstrate an understanding of the global environment of business.
4. Demonstrate an understanding of the ethical obligations and responsibilities of business.
5. Demonstrate the ability to use business tools.
6. Demonstrate the ability to communicate effectively.
8. Demonstrate the ability to be effective team and/or group members.
9. Demonstrate the ability to apply knowledge of business concepts and functions in an integrated manner.

## Degree Completion and Co-enrollment at Community Colleges

The Management Department has worked with many Oregon community colleges to develop Joint Enrollment, Transfer Credit (Articulation) Agreements and course sequences so that students may complete a degree with coursework taken from multiple institutions. See the general education requirements section of this catalog, the Oregon Tech Registrar's Web site, or a management advisor for additional information. Coursework is delivered in a traditional classroom/computer lab setting at the Klamath Falls and Wilsonville campuses. A capstone Senior Project provides management students with an opportunity to integrate their educational experience in the context of a "real world" business problem or project.

## Distance Education

Many of the core management courses are available online to facilitate the needs of degree completion students. Web courses are particularly appropriate for students capable of self-directed educational activities. These online degrees are offered utilizing Internet delivery and collaborative learning. Degrees available online are: BS in Health Care Management, Clinical Option and Radiologic Sciences Management Option; BS in Operations Management; BS in Information Technology Applications Development Option, Business systems analysis option, health informatics option; BAS in Technology and Management.

Distance education applicants are required to submit the *Distance Education Application for Admission* to the Distance Education department at Oregon Tech, accompanied by a \$100 non-refundable fee and official transcripts of each college or university attended.

### Required Student Equipment

Successful completion of these degrees requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

### Accreditation

Oregon Tech has received specialized accreditation for its business programs through the International Assembly for Collegiate Business Education (IACBE).

### Program Note

Students graduating with a Management Department degree are required to take a standardized exit exam in their last year.

# Health Care Management

## Degree Offered

Bachelor of Science in Health Care Management, with options in:

- Administration
- Clinical Management
- Radiologic Science Management

The Health Care Management degree fully prepares students to assume managerial and supervisory positions in the healthcare industry. Health care managers plan, direct, and coordinate medical and health services. They might manage an entire facility, or a specific clinical area or department, or manage a medical practice for a group of providers. OIT's Health Care Management has three options to meet the student's specific needs and interests.

Bachelor of Science in Health Care Management, Administration Option

## Administration Option

This program offers a BS in Health Care Management to students whose interests lie in business and health care administration. The curriculum is designed to prepare the graduate for entry and mid-level management positions and/or preparation to enter a Master's program in Health Care Administration, Hospital Administration or Public Health. Based on a core of common management courses, the program builds a broader base of understanding of the health care system in the U.S., its systems, policies and challenges. Embedded in the program is a minor in medical sociology. Students will finish the program with the successful completion of a capstone project or internship.

## Student Preparation and Admissions

Students must meet the standard OIT admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to OIT.

## Bachelor of Science in Health Care Management, Administration option Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
BUS 101	Introduction to Business	3
MATH 111	College Algebra	4
PSY 201	Psychology	3
WRI 121	English Composition	3
BIO 200	Medical Terminology	2
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BUS 223	Marketing I	3
Or		
BUS 337	Principles of Health Care Marketing	
ECO 201	Principles of Economics, Microeconomics	3
MIS 102	Spreadsheet Software Lab	1
WRI 122	Argumentative Writing	3
SPE 111	Public Speaking	3
<b>Total</b>		<b>13</b>

Freshman Year		Spring
ECO 202	Principles of Economics, Macroeconomics	3
SPE 321	Small Group & Team Communication	3
WRI 227	Technical Report Writing	3
SOC 204	Intro to Sociology	3
	Elective	3
<b>Total</b>		<b>15</b>

Sophomore Year		Fall
ACC 201	Principles of Accounting I	4
MIS 113	Intro to Database Mgmt	3
BUS 313	Health Care Systems and Policy	3
BIO 231	Human Anatomy and Physiology I	4
Or		
BIO 103	General Biology	
<b>Total</b>		<b>14</b>

Sophomore Year		Winter
BUS 256	Business Communication	3
BUS 316	Total Quality in Health Care	3
COM 205	Intercultural Communication	3
MATH 361	Statistical Methods	4
SOC 225	Medical Sociology	3
<b>Total</b>		<b>16</b>

Sophomore Year		Spring
ACC 203	Principles of Managerial Accounting	4
BUS 317	Health Care Management	3
SOC 325	Global Population Health	3
	Elective	3
	Humanities Elective	3
<b>Total</b>		<b>16</b>

# Bachelor of Science in Health Care Management, Clinical Option

## Clinical Option

This program bridges two disciplines; Allied Health and Management. The clinical option requires a current state and/or national registry, license or certificate in an approved allied health field. The degree prepares Allied Health professionals for advancement to management or supervisory roles. The BS degree in Health Care Management is offered in Klamath Falls and online. Students will finish the program with the successful completion of a capstone project or internship.

## Student Preparation and Admissions

To be eligible for admission to the Health Care Management, Clinical Option Program, students must meet the following criteria:

1. Meet the Oregon Tech general admissions requirements.
2. Provide documentation of a current state and/or national registry, license, or certificate in an approved allied health field.

Each prospective student's academic credits and registry, license, or certificate will be individually evaluated to determine transferability and acceptability of the coursework.

<b>Junior Year</b>		<b>Fall</b>
ACC 325	Finance Management	4
BUS 308	International Business	3
PSY 336	Health Psychology	3
MGT 321	Operations Management	3
BUS/ACC/MGT Elective		3
<b>Total</b>		<b>16</b>

<b>Junior Year</b>		<b>Winter</b>
COM 346	Health Communication	3
BUS 349	Human Resource Management I	3
STAT 414	Statistical Methods in Epidemiology	3
PHIL 331	Ethics in the Professions	3
Or		
PHIL 342	Business Ethics Elective	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Spring</b>
BUS 356	Business Presentations	4
MGT 445	Project Management	3
BUS 397	Human Resource Mgmt II	3
SOC 335	Health Inequality & Cultural Competency	3
	Humanities Elective	3
<b>Total</b>		<b>16</b>

<b>Senior Year</b>		<b>Fall</b>
BUS 457	Research Methods	3
BUS 441	Leadership I	3
BUS 467	Service Management	3
BUS 496	Senior Project	3
Or		
BUS 420	Applied Management Internship	
MIS 345	Health Care Information Systems Management	3
<b>Total</b>		<b>15</b>

<b>Senior Year</b>		<b>Winter</b>
BUS 497	Senior Project	3
BUS 442	Leadership II	3
	Elective	3
	Elective	3
	Elective	3
<b>Total</b>		<b>15</b>

<b>Senior Year</b>		<b>Spring</b>
PSY 347	Organizational Behavior	3
WRI 410	Proposal and Grant Writing	3
BUS 478	Cases in Strategy and Policy	3
	Elective	3
	Elective	3
<b>Total</b>		<b>15</b>

**Total credits required for B.S. in Health Care Management: Administration Option:**

**181**

## Curriculum

Required courses and recommended terms during which they should be taken:

<b>Prior Learning</b>		
<b>Registry Transfer Credits</b>		<b>44</b>

<b>Sophomore Year</b>		<b>Fall</b>
ACC 201	Principles of Accounting I	4
BIO 231	Human Anatomy and Physiology I	4
SPE 111	Public Speaking	3
WRI 121	English Composition	3
<b>Total</b>		<b>14</b>

<b>Sophomore Year</b>		<b>Winter</b>
BIO 232	Human Anatomy and Physiology II	4
MIS 102	Spreadsheet Software Lab	1
MATH 111	College Algebra	4
WRI 122	Argumentative Writing	3
	Elective	3
<b>Total</b>		<b>15</b>

<b>Sophomore Year</b>		<b>Spring</b>
ACC 203	Principles of Managerial Accounting	4
BIO 233	Human Anatomy and Physiology III	4
BUS 317	Health Care Management	3
BUS 226	Business Law	3
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>17</b>

<b>Junior Year</b>		<b>Fall</b>
ACC 325	Finance Management	4
PSY 201	Psychology	3
BUS 308	International Business	3
BUS 313	Health Care Systems and Policy	3
MIS 113	Introduction to Database Systems	3
<b>Total</b>		<b>16</b>

<b>Junior Year</b>		<b>Winter</b>
BIO 200	Medical Terminology	2
MATH 243	Introductory Statistics	
Or		
MATH 361	Statistical Methods	4
BUS 349	Human Resource Management I	3
ECO 201	Principles of Economics, Microeconomics	3
PHIL 331	Ethics in the Professions	
Or		
PHIL 342	Business Ethics	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Spring</b>
BUS 356	Business Presentations	4
ECO 202	Principles of Economics, Macroeconomics	3
SPE 321	Small Group & Team Communication	3
BUS 223	Marketing I	3
Or		
BUS 337	Principles of Health Care Marketing	
COM 205	Intercultural Communication	3
<b>Total</b>		<b>16</b>

## Radiologic Science Management Option

Senior Year		Fall
BUS 457	Research Methods	3
BUS 441	Leadership I	3
BUS 467	Service Management	3
BUS 496	Senior Project	3
Or		
BUS 420	Applied Management Internship	
MIS 345	Health Care Information Systems Management	3
<b>Total</b>		<b>15</b>

Senior Year		Winter
BUS 316	Total Quality in Health Care	3
BUS 497	Senior Project	3
	Upper Division Elective	3
	Humanities Elective	3
	Elective	3
<b>Total</b>		<b>15</b>

Senior Year		Spring
PSY 347	Organizational Behavior	3
WRI 410	Proposal and Grant Writing	3
BUS 478	Cases in Strategy and Policy	3
	Upper Division Elective	3
	Humanities Elective	3
<b>Total</b>		<b>15</b>

*Total credits required for B.S. in Health Care Management: Clinical Option:* 182

This program offers a BS in Health Care Management to students who hold a current registry through the American Registry of Radiologic Technologists (ARRT) and who wish to enhance their career by obtaining a management degree with emphasis on management of a medical imaging facility or department. It is designed for the radiologic technologist seeking skills and credentials that enable advancement to positions of middle management. The program is fully online with no requirement to come to campus and does not require clinical practice involving patient contact.

Students will finish the program with the successful completion of a capstone project or internship.

### Student Preparation and Admissions

Students must be registered through the ARRT and be in good standing. Students must meet the standard OIT admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to OIT.

### Distance Education Admissions Process

Distance education applicants are required to submit an Online Degree Completion Program Application for Admission to the OIT Distance Education Department accompanied by a \$100 non-refundable fee. Official transcripts from each college and university attended must also be sent to the Distance Education Department.

### Curriculum

This curriculum map is arranged in the typical term by term format however, online degree completion students follow a curriculum map loosely at best.

#### Prior Learning

Registry Transfer Credits	89
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Sophomore Year		Fall
MIS 113	Intro to Database Management	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
ACC 201	Principles of Accounting I	4
<b>Total</b>		<b>13</b>

Sophomore Year		Winter
MATH 111	College Algebra	4
MIS 102	Spreadsheet Software Lab	1
SPE 321	Small Group & Team Comm.	3
WRI 122	Argumentative Writing	3
BIO 200	Medical Terminology	2
<b>Total</b>		<b>13</b>

Sophomore Year		Spring
ECO 201	Principles of Economics, Micro	3
ACC 203	Principles of Managerial Accounting	4
BUS 223	Principles of Marketing	3
Or		
BUS 337	Health Care Marketing	
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>13</b>

Junior Year		Fall
ACC 325	Finance Management	4
BIO 231	Human Anatomy and Physiology I	4
Or		
BIO 103	General Biology	
MATH 243	Introductory Statistics	
Or		
MATH 361	Statistical Methods	4
BUS 313	Health Care Systems and Policy	3
<b>Total</b>		<b>15</b>

Junior Year		Winter
ECO 202	Principles of Economics, Macro	3
PSY 201/202/203	Psychology	3
	Math/Science elective	4
	Humanities elective	3
<b>Total</b>		<b>13</b>

Junior Year		Spring
BUS 226	Business Law	3
BUS 317	Health Care Management	3
BUS 356	Business Presentations	4
	Business elective	3
<b>Total</b>		<b>13</b>

<b>Senior Year</b>		<b>Fall</b>
BUS 308	International Business	3
BUS 457	Research Methods	3
BUS 496	Senior Project	3
Or		
BUS 420	Applied Management Internship	
MIS 345	Health Care Information Systems Management	3
<b>Total</b>		<b>12</b>

<b>Senior Year</b>		<b>Winter</b>
BUS 316	Total Quality in Health Care	3
BUS 497	Senior Project	3
PHIL 331	Ethics in the Professions	
Or		
PHIL 342	Business Ethics	3
PSY 347	Organizational Behavior	3
<b>Total</b>		<b>12</b>

<b>Senior Year</b>		<b>Spring</b>
WRI 410	Proposal and Grant Writing	3
BUS 478	Cases in Strategy and Policy	3
RDSC 365	Advanced Quality Assurance/Quality Control	3
	Humanities elective	3
<b>Total</b>		<b>12</b>

\* Any ACC, BUS, MGT, MIS course which is not required in your program and as approved by your advisor.

**Total credits required for B.S.in Health Care Management: Radiologic Science Option: 205**

# Information Technology

## Degree Offered

Bachelor of Science in Information Technology with options in:

- Accounting
- Applications Development
- Business/Systems Analysis
- Health Informatics

## Graduation Requirements

Graduation requirements for the Bachelor of Science Degree in Information Technology include 180 credit hours for the Accounting Option, 180 credit hours for the Applications Development option, 181 credit hours for the Business/Systems Analysis option, and 183 credits for the Health Informatics option.

## Objectives

The Bachelor of Science in Information Technology with its four options offers a challenging, state-of-the-art education for those interested in learning the dynamic and growing field of information technology. The field is interdisciplinary, with applications to all aspects of the economy. Graduating students are prepared to bridge the technology and management disciplines in their organizations. Core business disciplines taught include analytical skills and problem solving, business organization and management, project management, leadership, teams, and communications. In addition to the core business disciplines students choose an information technology focus in one of four options: applications development, business/systems analysis, health informatics or accounting. Each option is designed to produce graduates with the competencies necessary to succeed in the workplace or pursue further graduate level education.

## Career Opportunities

The Oregon Tech Information Technology degree with four options prepares students for a wide range of professions including accounting information systems, database administration, systems analyst, business systems consultant, network analyst, software applications specialist, PC support technician, technical writer, Web administrator and as vendor representatives for both hardware and software firms. Information Technology graduates are currently employed at firms including Consolidated Freightways, Hewlett-Packard, Microsoft and Intel. Through a combination of technical skills and business understanding, Information Technology graduates are uniquely prepared for faster advancement than many of their contemporaries.

## Accounting Option

The Information Technology Accounting Option combines coursework in accounting and information technology. Students will acquire both technical and accounting skills needed to prepare them for successful careers in accounting and accounting information systems. This unique program meets the needs of accounting students entering today's technology-oriented marketplace. Students entering this program will receive exposure and preparation in information systems. In addition, they will develop the skills and tools required to analyze, design, and implement different types of accounting systems. Upon graduation, students selecting this option should have sufficient knowledge to sit for the Certified Public Accountant (CPA) and the Certified Management Accountant (CMA) exams. This program prepares students for a variety of careers in accounting, financial management, management advisory services, and information technology.

## Bachelor of Science in Information Technology, Accounting Option Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Fall</b>
MATH 111	College Algebra	4	ACC 331	Intermediate Accounting I	4
PSY 201	Psychology	3	BUS 356	Business Presentations	4
WRI 121	English Composition	3	MIS 312	Systems Analysis I	4
	Laboratory Science elective	4	WRI 327	Advanced Technical Writing	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>15</b>
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Winter</b>
BUS 215	Principles of Management	3	ACC 320	Cost Accounting I	4
ECO 201	Principles of Economics, Microeconomics	3	ACC 325	Finance	4
MIS 102	Spreadsheet Software Laboratory	1	ACC 332	Intermediate Accounting II	4
SPE 111	Public Speaking	3	MIS 341	Relational Database Design I	4
WRI 122	Argumentative Writing Elective	3	Total		16
<b>Total</b>		<b>16</b>	<b>Junior Year</b>		<b>Spring</b>
<b>Freshman Year</b>		<b>Spring</b>	ACC 333	Intermediate Accounting III	4
ECO 202	Principles of Economics, Macroeconomics	3	ACC 405	Accounting Information Systems	4
MIS 275	Introduction to Relational Databases	3	PSY 347	Organizational Behavior	3
SPE 321	Small Group and Team Communication Elective Elective	3 3 3	MIS elective*		3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>14</b>
<b>Sophomore Year</b>		<b>Fall</b>	<b>Senior Year</b>		<b>Fall</b>
ACC 201	Principles of Accounting I	4	ACC 411	Income Tax Procedures	4
MATH 361	Statistical Methods I	4	ACC 435	Auditing	4
MIS 311	Introduction to Systems Analysis	3	ACC 496	Senior Project	3
WRI 227	Technical Report Writing Humanities elective	3 3	BUS 308	Principles of International Business Elective	3 3
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>17</b>
<b>Sophomore Year</b>		<b>Winter</b>	<b>Senior Year</b>		<b>Winter</b>
ACC 202	Principles of Accounting II	4	ACC 431	Advanced Accounting I	4
BUS 223	Marketing I	3	ACC 497	Senior Project Humanities elective MIS elective*	3 3 3
MATH 371	Finite Mathematics and Calculus I	4	Elective		3
MIS 256	Hardware/Software Integration	4	<b>Total</b>		<b>16</b>
<b>Total</b>		<b>15</b>	<b>Senior Year</b>		<b>Spring</b>
<b>Sophomore Year</b>		<b>Spring</b>	BUS 478	Cases in Strategy and Policy	3
ACC 203	Principles of Managerial Accounting	4	BUS 226	Business Law Humanities elective Elective	3 3 3
ACC 205	Computerized Accounting	3	<b>Total</b>		<b>12</b>
MIS 375	Decision Support Systems Elective	3 3			
<b>Total</b>		<b>13</b>			

\* Any MIS (Management Information Systems) course that is not already required.

*Total credits required for B.S. in Information Technology, Accounting Option:* 180

## Applications Development Option

The Information Technology, Applications Development Option focuses on the acquisition of theory and technical competencies to prepare students for successful careers as applications programmers. The curriculum is designed to produce graduates with the competencies, skills and attitudes necessary for success in the workplace or further graduate education. The management components include analytical skills and problem solving; business organization and management; project management; leadership, teams, and communications. Information technology skill areas include database development, applications development, Web development, technical support, telecommunications and additional technical electives. The BS in Information Technology, Applications Development Option is offered in Klamath Falls, Wilsonville and online.

## Bachelor of Science in Information Technology, Applications Development Option Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Winter</b>
MATH 111	College Algebra	4	MATH 371	Finite Mathematics and Calculus I	4
MIS 118	Programming Fundamentals	4	MIS 322	Systems Analysis II	4
MIS 275	Introduction to Relational Databases	3	MIS 351	Enterprise Network Design I	4
WRI 121	English Composition	3	WRI 350	Documentation Development	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>15</b>
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Spring</b>
ECO 201	Principles of Economics, Microeconomics	3	MIS 318	Advanced Programming	4
MIS 102	Spreadsheet Software Laboratory	1	MIS 344	Business Intelligence	3
MIS 256	Hardware/Software Integration	4	BUS 226	Business Law	3
SPE 111	Public Speaking	3		Elective	3
	Laboratory Science elective	4		Elective	3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>16</b>
<b>Freshman Year</b>		<b>Spring</b>	<b>Senior Year</b>		<b>Fall</b>
ECO 202	Principles of Economics, Macroeconomics	3	BUS 457	Business Research Methods II	3
MIS 218	Database Programming	4	MIS 375	Decision Support Systems	3
MIS 272	Fundamentals of Networking I	4	MIS 496	Senior Project Management	4
WRI 122	Argumentative Writing	3		Elective	3
<b>Total</b>		<b>14</b>		Technical elective*	3
			<b>Total</b>		<b>16</b>
<b>Sophomore Year</b>		<b>Fall</b>	<b>Senior Year</b>		<b>Winter</b>
ACC 201	Principles of Accounting I	4	ANTH 452	Globalization	
BUS 215	Principles of Management	3	or		
MIS 273	Fundamentals of Networking II	4	PSCI 326	World Politics in Transition	3
WRI 227	Technical Report Writing	3	MIS 497	Senior Project II	3
<b>Total</b>		<b>14</b>	PHIL 331	Ethics in the Professions	
			Or		
			PHIL 342	Business Ethics	3
				Humanities elective	3
				Technical elective*	3
			<b>Total</b>		<b>15</b>
<b>Sophomore Year</b>		<b>Winter</b>	<b>Senior Year</b>		<b>Spring</b>
BUS 223	Marketing I	3	BUS 478	Cases in Strategy and Policy	3
MIS 341	Relational Database Design I	4	MIS 498	Senior Project III	3
PSY 201	Psychology	3	PSY 347	Organizational Behavior	3
SPE 321	Small Group and Team			Humanities elective	3
	Communication	3		Technical elective*	3
	Elective	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>16</b>			
<b>Sophomore Year</b>		<b>Spring</b>			
ACC 203	Principles of Managerial Accounting	4			
MATH 361	Statistical Methods I	4			
MIS 311	Introduction to Systems Analysis	3			
MIS 442	Advanced Database Application Programming	4			
<b>Total</b>		<b>15</b>			
<b>Junior Year</b>		<b>Fall</b>			
ACC 325	Finance	4			
BUS 356	Business Presentations	4			
MIS 312	Systems Analysis I	4			
	Elective	3			
<b>Total</b>		<b>15</b>			

\* Any MIS or CST class approved by your advisor which is not required in your program excepting CST 101 and CST 102. Alternatively, ACC 405 or any appropriate GIS course approved by your advisor.

**Total credits required for B.S. in Information Technology, Applications Development Option: 180**



## Business/Systems Analysis Option

The Information Technology Business/Systems Analysis Option integrates technical, business, and interpersonal skills to prepare students for successful careers as business/systems analysts. The curriculum is designed to produce graduates with the competencies, skills and aptitudes necessary for success in the workplace or further graduate education. The management components include analytical skills and problem solving; business organization and management; project management; leadership, teams, and communications. Students gain theoretical and practical experience with systems analysis and design, project management, personal computers, operating systems, applications, networks, Web page design and development and databases.

The BS in Information Technology, Applications Development Option is offered in Klamath Falls, Wilsonville and online.

## Bachelor of Science in Information Technology, Business/Systems Analysis Option Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>
MATH 111	College Algebra	4
MIS 118	Programming Fundamentals	4
MIS 275	Introduction to Relational Databases	3
WRI 121	English Composition	3
<b>Total</b>		<b>14</b>
<b>Freshman Year</b>		<b>Winter</b>
ECO 201	Principles of Economics, Microeconomics	3
MIS 102	Spreadsheet Software Laboratory	1
MIS 256	Hardware/Software Integration	4
SPE 111	Public Speaking	3
	Laboratory Science elective	4
<b>Total</b>		<b>15</b>
<b>Freshman Year</b>		<b>Spring</b>
ECO 202	Principles of Economics, Macroeconomics	3
MIS 218	Database Programming	4
MIS 272	Fundamentals of Networking I	4
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>14</b>
<b>Sophomore Year</b>		<b>Fall</b>
ACC 201	Principles of Accounting I	4
BUS 215	Principles of Management	3
MIS 273	Fundamentals of Networking II	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>14</b>
<b>Sophomore Year</b>		<b>Winter</b>
BUS 223	Marketing I	3
MIS 341	Relational Database Design I	4
PSY 201	Psychology	3
SPE 321	Small Group and Team Communication	3
	Elective	3
<b>Total</b>		<b>16</b>
<b>Sophomore Year</b>		<b>Spring</b>
ACC 203	Principles of Managerial Accounting	4
BUS 356	Business Presentations	4
MATH 361	Statistical Methods I	4
MIS 311	Introduction to Systems Analysis	3
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Fall</b>
ACC 325	Finance	4
MIS 312	Systems Analysis I	4
PHIL 331	Ethics in the Professions	
Or		
PHIL 342	Business Ethics	3
	Elective	3
	Technical elective*	3
<b>Total</b>		<b>17</b>
<b>Junior Year</b>		<b>Winter</b>
BUS 226	Business Law	3
MATH 371	Finite Mathematics and Calculus I	4
MIS 322	Systems Analysis II	4
MIS 351	Enterprise Network Design I	4
WRI 350	Documentation Development	3
<b>Total</b>		<b>18</b>
<b>Junior Year</b>		<b>Spring</b>
MIS 375	Decision Support Systems	3
PSY 347	Organizational Behavior	3
WRI 327	Advanced Technical Writing	3
	Humanities elective	3
	Technical elective*	3
<b>Total</b>		<b>15</b>
<b>Senior Year</b>		<b>Fall</b>
BUS 457	Business Research Methods II	3
MGT 461	Lean/Six Sigma Management I	3
MIS 496	Senior Project Management	4
	Elective	3
	Elective	3
<b>Total</b>		<b>16</b>
<b>Senior Year</b>		<b>Winter</b>
ANTH 452	Globalization	
or		
PSCI 326	World Politics in Transition	3
MIS 497	Senior Project II	3
	Elective	3
	Technical Elective*	3
<b>Total</b>		<b>12</b>
<b>Senior Year</b>		<b>Spring</b>
BUS 478	Cases in Strategy and Policy	3
MIS 479	Current Topics in Information Technology	3
MIS 498	Senior Project III	3
	Humanities elective	3
	Technical elective*	3
<b>Total</b>		<b>15</b>

\* Any MIS or CST class approved by your advisor which is not required in your program excepting CST 101 and CST 102. Alternatively, ACC 405 or any appropriate GIS course approved by your advisor.

**Total credits required for B.S. in Information Technology, Business/Systems Analysis Option: 181**

## Health Informatics Option Objectives and Career Opportunities

The U.S. health care system is in the midst of a technology transformation, moving from paper-based records to integrated electronic health information systems. Technology transformation, specifically electronic health records, data warehouses and integrated health information systems, is changing the face of health care organizations and the delivery of care. One of the key factors in assuring a successful transformation is meeting the needs for highly qualified health informatics professionals and specialists.

The new roles for health informatics professionals are the result of the convergence of information management and information technologies. Health informatics professionals work in operational and management positions throughout the health care industry in such locales as hospitals, clinics, managed care organizations, software vendors and government agencies. Health informatics professionals are being called upon to design and use emerging information technologies with the goal of helping providers and patients access and utilize key information in both clinical and business management. Health Informatics provides support in areas such as clinical decision making, research, financial and revenue cycle management, and personal health management.

The BS in Information Technology, health informatics Option is offered in Klamath Falls, Wilsonville and online.

## Degree Requirements

The Health Informatics option requires 183 term hours. Required course work is outlined in the curriculum section. Transfer students should consult with the Registrar's Office and the Management Department to determine which of their courses will satisfy Oregon Tech course requirements.

## Bachelor of Science in Information Technology, Health Informatics Option

### Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>
MATH 111	College Algebra	4
MIS 118	Programming Fundamentals	4
MIS 275	Introduction to Relational Databases	3
WRI 121	English Composition	3
<b>Total</b>		<b>14</b>

<b>Freshman Year</b>		<b>Winter</b>
BIO 200	Medical Terminology	2
ECO 201	Principles of Economics, Microeconomics	3
MIS 102	Spreadsheet Software Laboratory	1
MIS 256	Hardware/Software Integration	4
SPE 111	Public Speaking	3
<b>Total</b>		<b>13</b>

<b>Freshman Year</b>		<b>Spring</b>
BIO 103	General Biology	4
ECO 202	Principles of Economics, Macroeconomics	3
MIS 218	Database Programming	4
MIS 272	Fundamentals of Networking I	4
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>18</b>

<b>Sophomore Year</b>		<b>Fall</b>
ACC 201	Principles of Accounting I	4
BUS 313	Health Care Systems and Policy	3
MIS 255	Health Informatics Concepts and Practices	3
MIS 273	Fundamentals of Networking II	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>17</b>

<b>Sophomore Year</b>		<b>Winter</b>
BUS 223	Marketing I	
or		
BUS 337	Principles of Health Care Marketing	3
MIS 341	Relational Database Design I	4
SPE 321	Small Group and Team Communication	3
	Elective	3
<b>Total</b>		<b>13</b>

<b>Sophomore Year</b>		<b>Spring</b>
ACC 203	Principles of Managerial Accounting	4
MATH 361	Statistical Methods I	4
MIS 311	Introduction to Systems Analysis	3
MIS 442	Advanced Database Application Programming	4
<b>Total</b>		<b>15</b>

<b>Junior Year</b>		<b>Fall</b>
ACC 325	Finance	4
BUS 317	Health Care Management	3
MIS 312	Systems Analysis I	4
MIS 345	Health Care Information Systems Management	3
<b>Total</b>		<b>14</b>

<b>Junior Year</b>		<b>Winter</b>
MATH 371	Finite Mathematics and Calculus I	4
MIS 322	Systems Analysis II	4
MIS 357	Information and Communication Systems in Health Care	3
BUS 356	Business Presentations Humanities elective	4 3
<b>Total</b>		<b>18</b>

<b>Junior Year</b>		<b>Spring</b>
BUS 456	Business Research Methods	3
MIS 344	Business Intelligence	3
MIS 375	Decision Support Systems	3
PSY 347	Organizational Behavior	3
WRI 327	Advanced Technical Writing	3
<b>Total</b>		<b>15</b>

<b>Senior Year</b>		<b>Fall</b>
MIS 496	Senior Project Management	4
	Humanities elective	3
	Elective	3
	Elective	3
	Technical elective*	3
<b>Total</b>		<b>16</b>

<b>Senior Year</b>		<b>Winter</b>
BUS 316	Total Quality in Health Care	3
MIS 497	Senior Project II	3
ANTH 452	Globalization	3
	Humanities elective	3
	Elective	3
<b>Total</b>		<b>15</b>

<b>Senior Year</b>		<b>Spring</b>
BUS 478	Cases in Strategy and Policy	3
MIS 445	Legal, Ethical and Social Issues in Health Care Technology	3
MIS 498	Senior Project III	3
	Elective	3
	Technical elective *	3
<b>Total</b>		<b>15</b>

\* Any BUS, CST, MGT or MIS class approved by your advisor which is not required in your program, excepting CST 101 and CST 102. Alternatively, any appropriate GIS course approved by your advisor.

**Total credits required for B.S. in Information Technology, Health Informatics Option: 183**

# Accounting, Entrepreneurship/Small Business, and Marketing Programs

## Degrees Offered

Bachelor of Science in Management, with options in:

Accounting

Entrepreneurship/Small Business Management

Marketing

## Objectives

The Management Department prepares leaders to manage organizations in the high technology environments of the 21st century. Students develop their abilities to contribute to an organization's performance through hands-on experience built on a solid theoretical base. The Management curriculum skillfully integrates a solid core of business/management courses with the unique benefits

of one of the country's leading institutes of technology. Students will also be prepared for graduate level education, such as the Master's in Business Administration (MBA) degree.

## Career Opportunities

The Management Department is known for producing "user-friendly" graduates. Graduate placement rate is among the best in the state.

Recruiters from industry and government agencies regularly visit the campus in search of Management Department bachelor degree candidates. Initial job titles include staff accountant, cost analyst, business unit manager, supervisor, marketing specialist, and sales manager.

## Graduation Requirements

Graduation requirements for the Bachelor of Science degree in Management include 181 credit hours for the Entrepreneurship/Small Business Management option, 180 credit hours for the Marketing option, and 181 credit hours for the Accounting option.

## Accounting Option

The accounting option is designed to prepare students for careers in public or private accounting. Students become familiar with computerized accounting applications and skilled in the principles of tax, financial, and cost accounting. Upon graduation students selecting this option should have sufficient knowledge to sit for the Certified Public Accountant (CPA) and the Certified Management Accountant (CMA) exams.

## Bachelor of Science in Management, Accounting Option Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Fall</b>
MATH 111	College Algebra	4	ACC 331	Intermediate Accounting I	4
PSY 201	Psychology	3	BUS 308	Principles of International Business	3
WRI 121	English Composition	3	BUS 356	Business Presentations	4
	Humanities elective	3	MIS 312	Systems Analysis I	4
	Laboratory Science elective	4	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>17</b>			
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Winter</b>
BUS 215	Principles of Management	3	ACC 320	Cost Accounting I	4
ECO 201	Principles of Economics, Microeconomics	3	ACC 325	Finance	4
MIS 102	Spreadsheet Software Laboratory	1	ACC 332	Intermediate Accounting II	4
SPE 111	Public Speaking	3	WRI 327	Advanced Technical Writing	3
WRI 122	Argumentative Writing Elective	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>16</b>			
<b>Freshman Year</b>		<b>Spring</b>	<b>Junior Year</b>		<b>Spring</b>
ECO 202	Principles of Economics, Macroeconomics	3	ACC 321	Cost Accounting II	4
MIS 275	Introduction to Relational Databases	3	ACC 333	Intermediate Accounting III	4
SPE 321	Small Group and Team Communication	3	ACC 405	Accounting Information Systems Elective	3
	Humanities elective	3	<b>Total</b>		<b>15</b>
	Elective	3			
<b>Total</b>		<b>15</b>			
<b>Sophomore Year</b>		<b>Fall</b>	<b>Senior Year</b>		<b>Fall</b>
ACC 201	Principles of Accounting I	4	ACC 411	Income Tax Procedures	4
MATH 361	Statistical Methods I	4	ACC 435	Auditing	4
MIS 311	Introduction to Systems Analysis	3	ACC 496	Senior Project	3
WRI 227	Technical Report Writing	3		Elective	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>14</b>
<b>Sophomore Year</b>		<b>Winter</b>	<b>Senior Year</b>		<b>Winter</b>
ACC 202	Principles of Accounting II	4	ACC 412	Corporate Taxation	4
BUS 223	Marketing I	3	ACC 431	Advanced Accounting I	4
MATH 371	Finite Mathematics and Calculus I	4	ACC 497	Senior Project	3
PHIL 331	Ethics in the Professions	3		Elective	3
Or				Elective	3
PHIL 342	Business Ethics		<b>Total</b>		<b>17</b>
<b>Total</b>		<b>14</b>			
<b>Sophomore Year</b>		<b>Spring</b>	<b>Senior Year</b>		<b>Spring</b>
ACC 203	Principles of Managerial Accounting	4	ACC 432	Advanced Accounting II	4
ACC 205	Computerized Accounting	3	BUS 478	Cases in Strategy and Policy	3
BUS 226	Business Law	3	PSY 347	Organizational Behavior	3
MIS 375	Decision Support Systems	3		Elective	3
	Elective	3	<b>Total</b>		<b>13</b>
<b>Total</b>		<b>16</b>			
<b>Total credits required for B.S.in Management, Accounting Option:</b>					<b>181</b>

## Entrepreneurship/Small Business Management Option

Students selecting the entrepreneurship/small business management option should equip themselves to be managers with complete understanding of all aspects of a business - either a small business or a business unit manager in a larger business. The focus is on the unique demands placed on this type of manager. Skills in writing business plans, starting and operating a business, cash flow management, costing and pricing products and global opportunities are emphasized and developed.

## Bachelor of Science in Management, Entrepreneurship/Small Business Management Option

### Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Fall</b>
BUS 101	Introduction to Business	3	BUS 314	Entrepreneurship I	3
MATH 111	College Algebra	4	BUS 356	Business Presentations	4
PSY 201	Psychology	3	BUS 467	Service Management	3
WRI 121	English Composition	3	MGT 321	Operations Management I	3
	Laboratory Science elective	4	MIS 375	Decision Support Systems	3
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>16</b>
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Winter</b>
BUS 215	Principles of Management	3	ACC 245	Payroll Accounting	3
ECO 201	Principles of Economics, Microeconomics	3	ACC 325	Finance	4
MIS 102	Spreadsheet Software Laboratory	1	BUS 226	Business Law	3
SPE 111	Public Speaking	3	BUS 335	Entrepreneurship II Communication elective	3
WRI 122	Argumentative Writing Elective	3	<b>Total</b>		<b>16</b>
<b>Total</b>		<b>16</b>	<b>Junior Year</b>		<b>Spring</b>
<b>Freshman Year</b>		<b>Spring</b>	ACC 205	Computerized Accounting	3
ECO 202	Principles of Economics, Macroeconomics	3	BUS 456	Business Research Methods	3
MIS 206	Introduction to Management Information Systems	3	MGT 445	Project Management Elective	3
SPE 321	Small Group and Team Communication	3		Elective	3
WRI 227	Technical Report Writing Humanities elective	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>15</b>	<b>Senior Year</b>		<b>Fall</b>
<b>Sophomore Year</b>		<b>Fall</b>	BUS 308	Principles of International Business	3
ACC 201	Principles of Accounting I	4	BUS 420	Applied Management Internship or	
BUS 223	Marketing I	3	BUS 496	Senior Project	3
MATH 361	Statistical Methods I	4	BUS 441	Leadership I	3
MIS 275	Introduction to Relational Databases	3	PSY 347	Organizational Behavior Humanities elective	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>15</b>
<b>Sophomore Year</b>		<b>Winter</b>	<b>Senior Year</b>		<b>Winter</b>
BUS 256	Business Communication	3	ANTH 452	Globalization	3
BUS 318	Marketing II	3	BUS 447	Controversial Issues in Management	3
BUS 349	Human Resource Management I	3	BUS 497	Senior Project Elective	3
MATH 371	Finite Mathematics and Calculus I	4		Elective	3
PHIL 331	Ethics in the Professions or		<b>Total</b>		<b>15</b>
PHIL 342	Business Ethics	3	<b>Senior Year</b>		<b>Spring</b>
<b>Total</b>		<b>16</b>	BUS 434	Global Marketing	3
<b>Sophomore Year</b>		<b>Spring</b>	BUS 442	Leadership II	3
ACC 203	Principles of Managerial Accounting	4	BUS 478	Cases in Strategy and Policy Elective	3
BUS 397	Human Resource Management II	3	<b>Total</b>		<b>12</b>
MIS 225	Business on the Internet Elective	4			
<b>Total</b>		<b>14</b>	<b>Total credits required for B.S. in Management, Entrepreneurship/Small Business Option: 181</b>		

## Marketing Option

The marketing option provides students with a broad background in business management with a strong emphasis in modern marketing concepts and practices. Marketing graduates enjoy careers in management, advertising, research, consulting, distribution, sales and entrepreneurial enterprises. This program provides the student with a core of management courses, in-depth business computer applications, detailed marketing courses, experience on individual and team projects, and preparation for entry into a master's program.

## Management, Marketing Option Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Fall</b>
BUS 101	Introduction to Business	3	BUS 319	Integrated Marketing Communication	3
MATH 111	College Algebra	4	BUS 356	Business Presentations	4
PSY 201	Psychology	3	BUS 467	Service Management	3
WRI 121	English Composition	3	MGT 321	Operations Management	3
	Laboratory Science elective	4	MIS 375	Decision Support Systems	3
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>16</b>
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Winter</b>
BUS 215	Principles of Management	3	ACC 325	Finance	4
ECO 201	Principles of Economics, Microeconomics	3	BUS 226	Business Law	3
MIS 102	Spreadsheet Software Laboratory	1	BUS 326	Sales and Sales Management	3
SPE 111	Public Speaking	3	BUS 435	Marketing III Communication elective	3
WRI 122	Argumentative Writing Elective	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>16</b>	<b>Junior Year</b>		<b>Spring</b>
<b>Freshman Year</b>		<b>Spring</b>	BUS 456	Business Research Methods	3
ECO 202	Principles of Economics, Macroeconomics	3	BUS 473	Marketing Plan Development	3
MIS 206	Introduction to Management Information Systems	3	MGT 445	Project Management Elective	3
SPE 321	Small Group and Team Communication	3		Elective	3
WRI 227	Technical Report Writing Humanities elective	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>15</b>	<b>Senior Year</b>		<b>Fall</b>
<b>Sophomore Year</b>		<b>Fall</b>	BUS 308	Principles of International Business	3
ACC 201	Principles of Accounting I	4	BUS 420	Applied Management Internship or	
BUS 223	Marketing I	3	BUS 496	Senior Project	3
MATH 361	Statistical Methods I	4	BUS 441	Leadership I	3
MIS 275	Introduction to Relational Databases	3	PSY 347	Organizational Behavior Humanities elective	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>15</b>
<b>Sophomore Year</b>		<b>Winter</b>	<b>Senior Year</b>		<b>Winter</b>
BUS 256	Business Communication	3	ANTH 452	Globalization	3
BUS 318	Marketing II	3	BUS 447	Controversial Issues in Management	3
BUS 349	Human Resource Management I	3	BUS 497	Senior Project Elective	3
MATH 371	Finite Mathematics and Calculus I	4		Elective	3
PHIL 331	Ethics in the Professions or		<b>Total</b>		<b>15</b>
PHIL 342	Business Ethics	3	<b>Senior Year</b>		<b>Spring</b>
<b>Total</b>		<b>16</b>	BUS 434	Global Marketing	3
<b>Sophomore Year</b>		<b>Spring</b>	BUS 442	Leadership II	3
ACC 203	Principles of Managerial Accounting	4	BUS 478	Cases in Strategy and Policy Elective	3
BUS 397	Human Resource Management II	3	<b>Total</b>		<b>12</b>
MIS 225	Business on the Internet Elective	4			
<b>Total</b>		<b>14</b>	<b>Total credits required for B.S. in Management, Marketing Option: 180</b>		

# Operations Management

## Degree Offered

Bachelor of Science in Operations Management

## Objectives

Operations Management is concerned with the oversight and coordination of equipment, materials, human capital and information required of a business operation to profitably deliver goods and services to the customers it serves. It involves the responsibility of ensuring operations are efficient and effective in terms of meeting and exceeding customer requirements. Operations Managers successfully blend the art of management with applied science through creativity, people skills, rational analysis and application of technology.

The Bachelor of Science in Operations Management degree program prepares students for leadership positions within a wide variety of product and service industries. Students selecting Operations Management develop mastery of concepts, tools, and skills in management sciences and specialties tailored to the industries of interest to the student upon graduation. Particular emphasis is directed toward development of skills in problem solving, project management, communication, and managing effectively in team-based work environments. Students are also prepared for graduate level education, such as the MBA (Master's in Business Administration) degree. The BS in Operations Management is offered in Klamath Falls, Wilsonville and online.

## Career Opportunities

Recruiters from industry and government agencies regularly visit the campus in search of bachelor's degree candidates in operations management. Initial job titles include: production planner, inventory control analyst, industrial engineer, production supervisor, and quality control manager. Typical departments in which graduates find themselves working are manufacturing, manufacturing engineering, industrial engineering, production control, finance, and quality assurance.

Students selecting the Operations Management degree will equip themselves to be managers in the challenging environment of modern manufacturing and service industries. Upon graduation they should be prepared to address critical issues related to

productivity management in a global competitive economy and play leadership roles in the design and implementation of quality control and management programs. They will have mastered a wide array of microcomputer technology and software applications, giving them a competitive edge in the job market.

## Graduation Requirements

As prescribed by the Management Department, graduation requirements for the Bachelor of Science degree in Operations Management include 180 credit hours.

## Bachelor of Science in Operations Management

### Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
BUS 215	Principles of Management	3
PSY 201	Psychology	3
WRI 121	English Composition	3
	Humanities elective	3
	Elective	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
MATH 111	College Algebra	4
MIS 102	Spreadsheet Software Laboratory	1
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
	Elective	3
<b>Total</b>		<b>14</b>

Freshman Year		Spring
BUS 223	Marketing I	3
ECO 201	Principles of Economics, Microeconomics	3
MIS 206	Introduction to Management Information Systems	3
WRI 227	Technical Report Writing	3
	Humanities elective	3
<b>Total</b>		<b>15</b>

Sophomore Year		Fall
ACC 201	Principles of Accounting I	4
MATH 361	Statistical Methods I	4
MIS 275	Introduction to Relational Databases	3
	Elective	3
	Elective	3
<b>Total</b>		<b>17</b>

Sophomore Year		Winter
BUS 226	Business Law	3
ECO 202	Principles of Economics, Macroeconomics	3
MATH 371	Finite Mathematics and Calculus I	4
	Elective	3
	Elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Spring
ACC 203	Principles of Managerial Accounting	4
BUS 356	Business Presentations	4
BUS 456	Business Research Methods	3
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>14</b>

## Bachelor of Applied Science in Technology and Management

The Bachelor of Applied Science (BAS) in Technology and Management degree is designed specifically for students who have completed a technical Associate of Applied Science (AAS) or Associate of Science (AS) degree and are seeking career advancement into management or in their technical career fields. The BAS builds on a core of 60 credits of career and technical education (CTE) courses taken as part of the AAS or AS degree, adding 65 credits of business, management, and information technology courses and 55 credits of broad-based general education courses to enable the BAS graduate to advance in the workplace or continue on to graduate school. The management core includes a two-term capstone senior project to enable the student to demonstrate successful integration of technical and managerial coursework. The BAS in Technology and Management is offered in Klamath Falls, Wilsonville, and online.

## Graduation Requirements

The BAS in Technology and Management requires 180 credits including 60 upper division credits and up to 60 lower-division career and technical education (CTE) credits transferred from an AAS or AS degree. In addition, the BAS includes 55 general education credits including 18 credits in communication, 12 credits of social science, nine credits in humanities and 16 credits of math and science including four credits of mathematics with a prerequisite of intermediate algebra or higher and four credits of laboratory science.

Junior Year		Fall
ACC 325	Finance	4
BUS 457	Business Research Methods II	3
MGT 321	Operations Management I	3
MGT 461	Lean/Six Sigma Management I	3
	Elective	3
<b>Total</b>		<b>16</b>

Junior Year		Winter
MGT 322	Operations Management II	3
MGT 462	Lean/Six Sigma Management II	3
WRI 327	Advanced Technical Writing	3
	Elective	3
	Elective	3
<b>Total</b>		<b>15</b>

Junior Year		Spring
MGT 323	Operations Management III	3
MGT 445	Project Management	3
MGT 463	Lean/Six Sigma Management III	3
MIS 375	Decision Support Systems	3
	Elective	3
<b>Total</b>		<b>15</b>

Senior Year		Fall
BUS 467	Service Management	3
BUS 420	Applied Management Internship	
or		
BUS 496	Senior Project	3
	Laboratory Science elective	4
	Elective	3
	Elective	3
<b>Total</b>		<b>16</b>

Senior Year		Winter
ANTH 452	Globalization	
or		
PSCI 326	World Politics in Transition	3
BUS 497	Senior Project	3
PHIL 331	Ethics in the Professions	3
PSY 347	Organizational Behavior	3
	Elective	3
<b>Total</b>		<b>15</b>

Senior Year		Spring
BUS 478	Cases in Strategy and Policy	3
	Elective	3
	Elective	3
	Elective	3
<b>Total</b>		<b>12</b>

*Total credits required for B.S. in Operations Management:* 180

## Bachelor of Applied Science in Technology and Management

### Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		
Up to 60 Career Technical Elective credits		

Sophomore Year		Winter
ACC 201	Principles of Accounting I	4
BUS 215	Principles of Management	
or		
BUS 304	Engineering Management	
or		
BUS 317	Health Care Management	3
ECO 201	Principles of Economics, Microeconomics	3
MATH 111	College Algebra	4
WRI 121	English Composition	3
<b>Total</b>		<b>17</b>

Sophomore Year		Spring
ACC 203	Principles of Managerial Accounting	4
ECO 202	Principles of Economics, Macroeconomics	3
MIS 206	Introduction to Management Information Systems	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>16</b>

Junior Year		Fall
MGT 321	Operations Management I	3
MGT 461	Lean/Six Sigma Management I	3
MIS 275	Introduction to Relational Databases	3
Or		
MIS 113	Introduction to Database Systems	
WRI 227	Technical Report Writing	3
MATH 361	Statistical Methods	4
<b>Total</b>		<b>16</b>

Junior Year		Winter
ACC 325	Finance	4
BUS 349	Human Resource Management I	3
MIS 102	Spreadsheet Software Laboratory	1
PHIL 331	Ethics in the Professions	
or		
PHIL 342	Business Ethics	3
	Technical elective (upper-division)*	3
<b>Total</b>		<b>14</b>

Junior Year		Spring
BUS 223	Marketing I	3
BUS 356	Business Presentations	4
MGT 445	Project Management	3
	Laboratory Science	4
<b>Total</b>		<b>14</b>



## Business Minor

The Minor in Business recognizes the achievement of 23 credits in business courses, some of which can be related to the student's chosen profession. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The Minor in Business may prove valuable to a technical student who ventures into management or consulting in his or her career field. It may enhance employability and improve graduate school possibilities. This minor is open to all majors except those in the Management Department.

### Requirements of Minor:

ACC 201	Principles of Accounting I	4
ACC 203	Principles of Managerial Accounting	4
BUS 215	Principles of Management	3
	or	
BUS 304	Engineering Management	3
	or	
BUS 317	Health Care Management	3
BUS 223	Marketing I	3
PSY 347	Organizational Behavior	3

And two courses chosen from upper-division BUS or MGT courses not on the required list, or MIS 311 or PSY 410.

A passing grade and a cumulative GPA of 2.0 or better in the business minor courses is required. Students are encouraged to consult with a Management Department advisor to select business courses that would be most applicable to their major and/or career goals.

## Information Technology Minor

The Information Technology (IT) Minor recognizes the achievement of 29/30 credits in technical courses. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The IT minor may prove valuable to management or technical students who want to demonstrate that they have additional skills in management information system and information technology areas. It may enhance employability and improve graduate school possibilities. The minor is open to all majors except IT.

### Requirements of Minor:

MIS 118	Programming Fundamentals or Programming Elective	4
MIS 218	Database Programming or Programming Elective	4
MIS 275	Introduction to Relational Databases	3
MIS 311	Introduction to Systems Analysis	3

MIS 312	Systems Analysis I	4
MIS 341	Relational Database Design I	4
MIS 442	Advanced Database Application Programming	4
MIS 322	Systems Analysis II or	
BUS 344	Business Intelligence	4/3

## International Business Minor

The Minor in International Business recognizes the achievement of 22 credits in international courses. The Minor in International Business may prove valuable to a technical student who ventures into management or consulting in his or her career field. It may enhance employability and improve graduate school possibilities. This minor is open to all majors and is especially recommended for students with an interest in management and/or global affairs.

### Requirements of Minor:

BUS 308	Principles of International Business	3
COM 205	Intercultural Communication	3
BUS 387	International Human Resource Management	
	or	
PSCI 326	World Politics in Transition	
	or	
PSCI 497	United States Foreign Policy	3
BUS 434	Global Marketing	3
ECO 367	International Economics and Finance Management	4
MIS 311	Introduction to Systems Analysis	3
PSCI 250	Introduction to World Politics	3
<b>Total</b>		<b>22</b>

### Suggested Social Science Electives

GEOG 106	Cultural Geography I	3
HIST 103	History of Western Civilization	3
PSCI 326	World Politics in Transitions	3
PSCI 497	United States Foreign Policy	3

### Suggested Open Electives

COM 320	Advanced Intercultural Communication	3
	Any foreign language sequence	4-4-4

### Suggested Humanities Electives

	Any second year foreign language sequence	4-4-4
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### Strongly Recommended

	Study Abroad Program—	
	1 semester/2 terms	4-4-4

A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor. Students are encouraged to consult with a management advisor to schedule courses.

Senior Year		Fall
BUS 441	Leadership I	3
BUS 467	Service Management	3
BUS 496	Senior Project	3
SPE 321	Small Group and Team Communication	3
BUS 457	Business Research Methods II	3
<b>Total</b>		<b>15</b>

Senior Year		Winter
ANTH 452	Globalization	3
BUS 497	Senior Project	3
PSY 347	Organizational Behavior	3
	Humanities elective	3
	Math/Science elective	4
<b>Total</b>		<b>16</b>

Senior Year		Spring
WRI 327	Advanced Technical Writing	3
BUS 226	Business Law	3
BUS 478	Cases in Strategy and Policy	3
	Humanities elective	3
<b>Total</b>		<b>12</b>

\* Technical electives include upper-division courses in ACC, BUS, MGT, MIS, GIS, or PSY.

Note: The BAS degree specifies 60 upper-division credits. Students transferring in lower-division course equivalents do not receive upper-division credit and may be required to take upper-division electives to meet the minimum 60 credits of upper-division credits required for the BAS degree.

**Total credits required for B.A.S. in Technology and Management: 180**

## Specialization Programs

Oregon Tech offers four specializations as a complement to the three Bachelor of Science degree options in Management. These are Accounting, Entrepreneurship and Small Business, Marketing, and Travel and Tourism. The courses in the Accounting, Entrepreneurship and Small Business, and Marketing specializations have been selected from the curricular content of the three corresponding degree options. The courses in the Travel and Tourism specialization have been developed specifically for this specialization. They are online courses offered by the Department of Management through Distance Education.

## Accounting

Oregon Tech's specialization in Accounting prepares the student for a wide range of accounting related positions in modern technological industries, financial institutions and other service-oriented businesses. The program includes training in computer software essential to accounting functions. This hands-on exposure can qualify the student for work in many high technology industries which utilize computer accounting applications.

### Required Courses

ACC 201	Principles of Accounting I	4
ACC 202	Principles of Accounting II	4
ACC 203	Principles of Managerial Accounting	4
ACC 205	Computerized Accounting	3
MIS 102	Spreadsheet Software Laboratory	1

## Entrepreneurship and Small Business Management

Oregon Tech's specialization in Entrepreneurship/Small Business provides the student with foundational skills and background in business management emphasizing entrepreneurship. The student should learn skills needed to start a business successfully, gain the knowledge required to run small businesses, and develop the entrepreneurship skills to make big companies run like small companies.

### Required Courses

BUS 215	Principles of Management	3
BUS 223	Marketing I	3
BUS 314	Entrepreneurship I	3
BUS 335	Entrepreneurship II	3
BUS 434	Global Marketing	3
BUS 447	Controversial Issues in Management	3

## Marketing

Oregon Tech's specialization in Marketing provides the student with a foundational background in business management with an emphasis in modern marketing concepts and practices. Upon completion, the student should be better qualified for a career in management, advertising, consulting, distribution or sales.

### Required Courses

BUS 215	Principles of Management	3
BUS 223	Marketing I	3
BUS 318	Marketing II	3
BUS 319	Integrated Marketing Communication	3
BUS 326	Sales and Sales Management	3

## Travel and Tourism

Oregon Tech's 15 credit online specialization in Travel and Tourism provides students with a broad foundational background in the hospitality and tourism industries. The information contained in these courses is important for anyone interested in learning more about the travel industry or who likes to travel. This specialization also gives students the knowledge necessary to obtain entry level positions in the hospitality and tourism industries.

### Required Courses

BUS 309	Introduction to Tourism	3
BUS 347	Geography of Travel and Tourism	3
BUS 350	Hospitality Management	3
BUS 358	Marketing for Hospitality and Tourism	
or		
BUS 399	Marketing Special Topics: Marketing Tourism	3
BUS 385	Ecotourism	3

## Six Sigma Green Belt Emphasis

The Management Department offers students the opportunity to earn a Six Sigma Green Belt certification. The Green Belt certification is an emphasis under the Bachelor of Science in Management, Entrepreneurship/Small Business Management option, Management, Marketing option or the Operations Management degree program. In addition to the fundamental management curriculum, the emphasis requires the completion of a Lean/Six Sigma Senior project. Those attaining the emphasis will be well-positioned to work in companies that deploy Six Sigma.

Additionally, employees of companies that deploy Six Sigma may complete the course work and project to obtain their certification.

Students completing the Six Sigma Green Belt Emphasis must complete the following courses and their prerequisites. Prerequisites may be waived for industry students depending on their individual backgrounds and abilities.

BUS 457	Business Research Methods II	3
MGT 445	Project Management	3
MGT 461	Lean/Six Sigma Management I	3
MGT 462	Lean/Six Sigma Management II	3
MGT 463	Lean/Six Sigma Management III	3
BUS 496	Senior Project	3
BUS 497	Senior Project	3

It should be noted that for OM majors, all of these courses are currently in the curriculum map. No additional coursework is required with the exception that the Senior Project series must be a Six Sigma project.

## Renewable Energy Management Emphasis

The Management Department offers students the opportunity to complete a Renewable Energy Management emphasis under the Bachelor of Science in Management, Entrepreneurship/Small Business Management option or the Operations Management degree program. In addition to the fundamental management curriculum, the emphasis requires additional coursework in chemistry, management information systems, humanities, history, economics and management. Those attaining the emphasis will be prepared to successfully integrate skills in the social, environmental, economic, business and management aspects of energy management.

### Requirement of Emphasis

CHE 201	General Chemistry	3
CHE 204	General Chemistry Laboratory	1
or		
PHY 201	General Physics	4
MATH 112	Trigonometry	4
ECO 357	Energy Economics and Policy	3
HIST 356	A History of Energy	3
HUM 125	Introduction to Technology, Society and Values	3
REE 201	Introduction to Renewable Energy	3
MIS 115	Visual BASIC Programming	4
MGT 212	Fundamentals of Renewable Energy Management	3

## Post Baccalaureate Certificate in Accounting

This certificate is available to students who have a baccalaureate degree and are continuing their education in accounting. Completion of the certificate will allow students to meet the requirements for admission to the Certified Public Accountant (CPA) exam and prepare them for a variety of career paths including CPA and Certified Management Accountant (CMA).

### Required Courses (32 credits)

ACC 320	Cost Accounting I	4
ACC 331	Intermediate Accounting I	4
ACC 332	Intermediate Accounting II	4
ACC 333	Intermediate Accounting III	4
ACC 405	Accounting Information Systems	4
ACC 411	Income Tax Procedures	4
ACC 431	Advanced Accounting I	4
ACC 435	Auditing	4

### Elective Courses (Choose at least 15 credits from the following courses)

ACC 321	Cost Accounting II	4
ACC 325	Finance	4
ACC 412	Corporate Taxation	4
ACC 432	Advanced Accounting II	4
ACC 465	Case Studies in Accounting	4
BUS 226	Business Law	3
BUS 345	Fraud Examination	3
MIS 312	Systems Analysis I	4

Note: At least 36 credits must be taken at Oregon Tech Manufacturing and Mechanical Engineering and Technology Department

# Manufacturing and Mechanical Engineering and Technology Department

Brian Moravec, *Department Chair*

Joe Stuart, *Program Director, Undergraduate Manufacturing Engineering Technology*

Wangping Sun, *Program Director, Graduate Manufacturing Engineering Technology*

Sean Sloan, *Program Director, Mechanical Engineering*

David Culler, *Program Director, Mechanical Engineering Technology*

Geoffrey Peter, *Program Director, Wilsonville Programs*

John Bridge, *Program Director, Oregon Tech–Seattle*

*Professors:* H. Currin, N. Mead, R. Shih, B. Moravec, L. Wolf

*Associate Professors:* J. Bridge, D. Culler, J. Hayen, N. Mead, G. Peter, J. Stuart, W. Sun

*Assistant Professors:* I. Demeshko-Prosnik, S. Sloan,

## Degrees Offered

Master of Science in Manufacturing Engineering Technology

Bachelor of Science in Manufacturing Engineering Technology

Bachelor of Science in Mechanical Engineering

Bachelor of Science in Mechanical Engineering Technology

## Manufacturing Engineering Technology

### Degrees Offered

Master of Science in Manufacturing Engineering Technology

Bachelor of Science in Manufacturing Engineering Technology

### Program Mission Statement

The Manufacturing Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in Manufacturing Engineering Technology.

### Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Manufacturing Engineering Technology Program are to produce graduates who:

- are able to analyze and design practical mechanical and manufacturing systems.
- communicate effectively and work well on team-based engineering projects.
- succeed in entry-level manufacturing engineering positions.
- pursue continued professional development.

### Career Opportunities

Manufacturing Engineering graduates will find a wide range of opportunities for employment in manufacturing design, research and development, testing, educational institutions, consulting and business. Manufacturing Engineering Technology also prepares students for further study in graduate school. In today's engineering environment, manufacturing engineers are often called upon to perform a wide range of tasks, from designing and purchasing manufacturing equipment to improving and troubleshooting the manufacturing process. Manufacturing engineers are involved in the design and continuous improvement of products, manufacturing equipment and production tooling. The Manufacturing Engineering curriculum provides education in a variety of areas including manufacturing process, robotics and automation, industrial controls, manufacturing tool design, computer aided design and manufacturing, engineering materials, manufacturing planning and quality control. Technical electives allow the student flexibility in developing technical breadth or focus in their areas of interest.

### Bachelor Program Objectives

The objective of the Manufacturing Engineering Technology undergraduate program is to offer the student a quality education that provides the greatest possible opportunity

for rewarding and successful careers. This includes practical training and technical education in engineering, manufacturing processes, and manufacturing equipment as well as supplemental coursework in communications, mathematics, science, social science, and business.

### Master Program Objectives

The objective of the graduate program in Manufacturing Engineering Technology is to offer students an advanced level of education that will help them to be successful in their professional career. This includes the theoretical and practical training in manufacturing systems, design for manufacturability, development of lean enterprise, quality engineering, computer-aided manufacturing, project management and information systems. The master's degree is also available online to students meeting the admission requirements for the program. There are no residency requirements for this degree. The same degree requirements apply to the online program.

### Student Preparation

Students planning to enter the Manufacturing Engineering Technology Program are strongly encouraged to take mathematics and science training in high school. In addition, courses such as drafting, CAD, computer skills, and industrial arts will prove beneficial.

## Cooperative Education Program

Students in the bachelor of science degree program have an opportunity to work in industry for a specified time and receive college credit. They are encouraged to meet with the Manufacturing Engineering Technology Undergraduate Program Director. MFG students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <http://mecop.ous.edu>.

## Accreditation

The Bachelor of Science in Manufacturing Engineering Technology is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Degree Requirements— Master of Science

The Master of Science in Manufacturing Engineering Technology requires completing 45 credit hours of graduate work, with at least 30 credit hours of graduate coursework from the following four Curriculum Content Areas (CCAs):

1. Engineering Science and Design Technology
2. Manufacturing Software and Computer Integration
3. Advanced Manufacturing Materials and Processes Technology
4. Business, Financial and Management Processes

In addition to the 30 CCA credit hours, students must complete 12 credits toward thesis or 9 credits toward an approved project and three credits in graduate seminars. Students must take at least one course in each of the four CCAs and three courses in at least one CCA. All graduate courses are three credits each. See Master's student advisor to complete an academic plan.

## Degree Requirements

The Bachelor of Science in Manufacturing Engineering Technology requires completing 192 credit hours, as prescribed in the following curriculum outline. Several of these courses are titled Manufacturing elective, and allow the student some flexibility to pursue specific career objectives within the manufacturing engineering field. Upper-division manufacturing engineering technology courses not specifically required for graduation, as well as selected upper-division mechanical engineering technology courses and other approved courses, may be used as Manufacturing electives. Students should contact their advisor for specific details as to which courses qualify as manufacturing electives. In order to satisfy the engineering science elective, the student must complete one of the following courses: Engineering Mechanics: Dynamics (ENGR 212), Fluid Mechanics (MET 218), or Thermodynamics (ENGR 355). In order to satisfy the business/management restricted elective the student must complete one of the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461, or MGT 462.

# Bachelor of Science in Manufacturing Engineering Technology

## Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
MATH 111	College Algebra	4
MET 111	Orientation I	2
WRI 121	English Composition	3
	Humanities/Social Science elective*	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MFG 120	Manufacturing Processes I	4
MATH 112	Trigonometry	4
MET 112	Orientation II	2
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
MFG 103	Introductory Welding Processes	3
MATH 251	Differential Calculus	4
MET 241	CAD for Mechanical Design I	2
SPE 111	Public Speaking	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>15</b>

Sophomore Year		Fall
MFG 314	Geometric Dimensioning and Tolerancing	3
MATH 252	Integral Calculus	4
MET 160	Materials I	3
MET 242	CAD for Mechanical Design II	2
PHY 201/221	General Physics	4
<b>Total</b>		<b>16</b>

Sophomore Year		Winter
ENGR 211	Engineering Mechanics: Statics**	4
MFG 112	Introduction to Manufacturing Processes	3
MATH 361	Statistical Methods I	4
PHY 202/222	General Physics	4
<b>Total</b>		<b>15</b>

Sophomore Year		Spring
ENGR 213	Engineering Mechanics: Strength of Materials**	4
ENGR 236	Fundamentals of Electric Circuits	3
ENGR 266	Computer Programming for Engineers	3
MATH 362	Statistical Methods II	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>17</b>

Junior Year		Fall
MFG 313	Manufacturing Analysis and Planning	3
MFG 341	Numeric Control Programming	3
MET 315	Machine Design I	3
MET 375	Solid Modeling	3
MET 360	Materials II	3
<b>Total</b>		<b>15</b>

Junior Year		Winter
MFG 333	Statistical Methods for Quality Improvement	3
MFG 342	Computer Aided Machining	3
MFG 343	Manufacturing Tool Design	3
MET 316	Machine Design II	3
MET 326	Electric Power Systems	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>18</b>

Junior Year		Spring
MGT 345	Engineering Economy	3
MFG 331	Industrial Controls	3
MFG 344	Design of Manufacturing Tooling	3
SPE 321	Small Group and Team Communication	3
MGT 445	Project Management	3
<b>Total</b>		<b>15</b>

Senior Year		Fall
ANTH 452	Globalization	3
MFG 453	Automation and Robotics in Manufacturing	3
MFG 454	Thermal Systems for Manufacturing	3
MFG 461	Senior Project I	3
WRI 327	Advanced Technical Writing	3
	Engineering Science elective***	3
<b>Total</b>		<b>18</b>

Senior Year		Winter
MFG 462	Senior Project II	3
	BUS/MGT restricted elective****	3
	Humanities/Social Science elective*	3
	Manufacturing elective****	3
	Manufacturing elective****	3
<b>Total</b>		<b>15</b>

Senior Year		Spring
ENGR 485	Fundamentals of Engineering Exam	1
ENGT 415	Occupational Safety	3
MFG 447	Lean Manufacturing	3
MFG 463	Senior Project III	3
	Humanities/Social Science elective*	3
	Manufacturing elective****	3
<b>Total</b>		<b>16</b>

\* Humanities/Social Science requirements: 9 credits of Humanities electives and 9 credits of Social Science electives. ANTH 452 Globalization counts as 3 Social Science credits.

\*\* ENGT 230, ENGT 231, ENGT 232 sequence may be substituted for the ENGR 211, ENGR 213 sequence.

\*\*\* Engineering Science elective: complete one of the following courses: Engineering Mechanics: Dynamics (ENGR 212), Fluid Mechanics (MET 218), or Thermodynamics (ENGR 355).

\*\*\*\* Manufacturing electives: selected Manufacturing and/or Mechanical Engineering Technology courses. Consult with your advisor for a list of approved courses.

\*\*\*\*\* Business/Management restricted elective: complete one of the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461, or MGT 462.

**Total credits required for B.S. in Manufacturing Engineering Technology: 192**

## Concurrent Degree

The Mechanical and Manufacturing Engineering Technology Department provides the opportunity for the interested student to earn concurrent degrees in Manufacturing Engineering Technology (MFG) and Mechanical Engineering Technology (MET) or Mechanical Engineering (MECH). Students who earn both degrees are highly sought after and have been very successful in industry. The concurrent degree program usually requires the student to complete an additional year of study beyond the Bachelor's Degree in Mechanical Engineering or Mechanical Engineering Technology.

Fall			
MFG 313	Manufacturing Analysis and Planning	3	
MFG 341	Numerical Control Programming	3	
MFG 453	Automation and Robotics in Manufacturing	3	
	BUS/MGT Restricted elective*	3	
	Manufacturing elective***	3	
Total		15	
Winter			
MFG 112	Introduction to Manufacturing Processes**	3	
MFG 333	Statistical Methods for Quality Improvement	3	
MFG 342	Computer Aided Machining	3	
MFG 343	Manufacturing Tool Design	3	
	BUS/MGT Restricted elective*	3	
	Manufacturing elective*	3	
Total		18	

Spring			
ENGT 415	Occupational Safety	3	
MFG 344	Design of Manufacturing Tooling	3	
MFG 428	Manufacturing Engineering Certification	1	
MFG 447	Lean Manufacturing	3	
MATH 362	Statistical Methods II	4	
Total		14	

\* Restricted elective from the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461 or MGT 462.

\*\* This course is already required for the BSMET degree.

\*\*\* These courses must be different than those used to satisfy the BS degree in MET or MECH. In all cases the student must have at least 36 credits of additional coursework beyond the MET or MECH degree to qualify for the concurrent degree in MFG.

# Mechanical Engineering

## Degree Offered

Bachelor of Science in Mechanical Engineering

## Program Mission Statement

The Mechanical Engineering Program at Oregon Institute of Technology is an applied engineering program. Its mission is to provide graduates the skills and knowledge for successful careers in mechanical engineering.

## Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing alumni to achieve.

The program expects graduates to achieve, within several years of graduation, the following objectives. Mechanical Engineering graduates will have:

- demonstrated the ability to analyze, design and improve practical thermal and/or mechanical systems.
- shown the ability to communicate effectively and work well on team-based engineering projects.
- succeeded in entry-level mechanical engineering positions regionally and nationally.
- pursued continued professional development, including professional registration, if desired.
- successfully pursued engineering graduate studies and research, if desired.

## Career Opportunities

Mechanical Engineering is the broadest branch of engineering providing graduates the ability to pursue many varied career paths. It encompasses a wide variety of specialties including alternative energy, mechanical design, thermal/fluids/heat transfer, and mechatronics to name a few. Graduates will find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The Mechanical Engineering degree also prepares the students for further study in graduate school.

## Objectives of the Program

The Mechanical Engineering Program at Oregon Institute of Technology provides an excellent theoretical and applied or hands on engineering education. The program provides graduates with a foundation in fundamentals, applications, design, project management, communications, and professional and ethical responsibility.

The program offers coursework in all of the above areas beginning with mathematics, science, machining, welding, and computer aided design topics in the freshman year. Engineering science and physics courses are typically taken by the student in the sophomore year. Junior and senior curriculum is devoted to analysis, design, and testing aspects of mechanical engineering. Technical electives are available for students to pursue their particular fields of interest.

Throughout the four-year curriculum, emphasis is placed on oral and written communication skills, teamwork and cooperation, and hands on laboratory and project work. Graduates are well-rounded engineers and readily accepted into industry or graduate programs.

## Student Preparation

Students planning to enter the Mechanical Engineering curriculum should undertake Mathematics/science training in high school. Such courses as algebra, trigonometry, calculus, physics, chemistry, drafting, CAD, writing, speech, and shop classes will prove beneficial.

## Cooperative Field Experience

There is an opportunity for students in the Bachelor of Science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Program Director. Mechanical Engineering students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <http://mecop.ous.edu>.

## Accreditation

The Mechanical Engineering Program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

## Degree Requirements

In the curriculum listings appear several courses titled "MECH Elective." MECH electives allow the student to select and pursue specific career objectives within the mechanical engineering field. MECH electives are upper-division MECH courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled "Transfer Students" and "Admission to Baccalaureate Programs."

The Bachelor of Science in Mechanical Engineering requires 192 credit hours as prescribed in the following curriculum outline.

## Bachelor of Science in Mechanical Engineering Curriculum

Required courses and recommended terms during which they should be taken:

### Freshman Year Fall

CHE 201	General Chemistry	3
CHE 204	General Chemistry Laboratory	1
MET 111	Orientation I	2
WRI 121	English Composition	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>12</b>

### Freshman Year Winter

CHE 202	General Chemistry	3
CHE 205	General Chemistry Laboratory	1
MET 112	Orientation II	2
MFG 103	Introductory Welding Processes	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>12</b>

### Freshman Year Spring

MATH 251	Differential Calculus	4
MFG 120	Manufacturing Processes I	4
MET 160	Materials I	3
MET 241	CAD for Mechanical Design I	2
SPE 111	Public Speaking	3
<b>Total</b>		<b>16</b>

### Sophomore Year Fall

MATH 252	Integral Calculus	4
MET 242	CAD for Mechanical Design II	2
PHY 221	General Physics with Calculus	4
WRI 227	Technical Report Writing	3
	Economics elective	3
<b>Total</b>		<b>16</b>

### Sophomore Year Winter

ENGR 211	Engineering Mechanics: Statics	4
MATH 254N	Vector Calculus I	4
MATH 361	Statistical Methods I	
or		
MATH 465	Mathematical Statistics	4
PHY 222	General Physics with Calculus	4
<b>Total</b>		<b>16</b>

### Sophomore Year Spring

ENGR 266	Computer Programming for Engineers	3
ENGR 213	Engineering Mechanics: Strength of Materials	4
ENGR 236	Fundamentals of Electric Circuits	3
MATH 321	Applied Differential Equations I	4
PHY 223	General Physics with Calculus	4
<b>Total</b>		<b>18</b>

### Junior Year Fall

MATH 341	Linear Algebra I	4
MFG 314	Geometric Dimensioning and Tolerancing	3
MECH 318	Fluid Mechanics I	4
MECH 363	Instrumentation	3
MET 375	Solid Modeling	3
<b>Total</b>		<b>17</b>

### Junior Year Winter

ENGR 212	Engineering Mechanics: Dynamics	3
ENGR 355	Thermodynamics	3
MECH 315	Machine Design I	3
MECH 360	Materials II	3
MET 326	Electric Power Systems	3
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>18</b>

### Junior Year Spring

HUM 125	Introduction to Technology, Society and Values	3
MATH 451	Numerical Methods I	4
MECH 313	Thermodynamics II	3
MECH 316	Machine Design II	3
	MECH Elective	3
<b>Total</b>		<b>16</b>

### Senior Year Fall

MECH 323	Heat Transfer I	3
MECH 351	Finite Element Analysis	3
MECH 490	Senior Projects I	3
WRI 327	Advanced Technical Writing	3
	MECH elective	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>18</b>

### Senior Year Winter

MECH 417	Fluid Mechanics II	3
MECH 437	Heat Transfer II	2
MECH 480	Vibrations	3
MECH 491	Senior Projects II	3
PHIL 331	Ethics in the Professions	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>17</b>

### Senior Year Spring

ENGR 485	Fundamentals of Engineering Exam	1
MGT 345	Engineering Economy	3
MECH 436	Applied Control Systems	3
MECH 492	Senior Projects III	3
	MECH elective	3
	Humanities/Social Science elective*	3
<b>Total</b>		<b>16</b>

**Total Credits Required for B.S. in Mechanical Engineering: 192**

\* In addition to HUM 125, PHIL 331 and the Economics elective, students must take 3 credits of Humanities and 9 credits of Social Science. Activity or performing based Humanities courses are not accepted.



# Mechanical Engineering Technology

## Degree Offered

Bachelor of Science in Mechanical Engineering Technology

## Program Mission Statement

The Mechanical Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in mechanical engineering and manufacturing.

## Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Mechanical Engineering Technology Program

are to produce graduates who:

- are able to analyze and design practical mechanical systems.
- communicate effectively and work well on team-based engineering projects.
- succeed in entry-level mechanical and manufacturing engineering positions.
- pursue continued professional development.

## Career Opportunities

Mechanical Engineering Technology graduates find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The largest number of graduates are employed by manufacturing firms. There, the graduates may develop new products, improve existing products, modify existing products for easier manufacture, or develop equipment for use in the production process. The work done by Mechanical Engineering Technologists varies widely. Interfacing computers and machines is a rapidly growing area of employment. This involvement with robotics and automation is having an impact on most mechanical systems. New materials such as high strength ceramics and polymers, fiber reinforced plastics, and new bonding agents are growing in importance and their applications will offer many interesting and fulfilling careers. Energy systems become increasingly important as energy

costs rise. Aerospace firms employ many Oregon Tech graduates in design, testing, and manufacturing. Careers in such traditional areas as power plants, heating and cooling systems, gas and steam turbines, and automotive systems are within the domain for the Mechanical Engineering Technologist.

## Objectives of the Program

The objective of the Mechanical Engineering Technology Program is to ensure that graduates of this curriculum acquire competency in those theoretical, applied engineering and practical subjects necessary to become successful in their careers. The program strives to maintain a reputation for academic standards that will assure graduates a welcome by prospective employers.

## Student Preparation

Students planning to enter the Mechanical Engineering Technology curriculum should undertake mathematics-science training in high school. Such courses as algebra, geometry, trigonometry, physics, chemistry, drafting, CAD, English, writing, speech, and shop classes will prove beneficial.

## Cooperative Field Experience

There is an opportunity for students in the bachelor of science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Technology program director. MET students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <http://mecop.ous.edu>.

## Accreditation

The Mechanical Engineering Technology Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/ or the Secretary of the U.S. Department of Education.

## Degree Requirements

In the curriculum listings appear several courses titled "MET elective." MET electives allow the student to select and pursue specific career objectives within the mechanical engi-

neering technology field. MET electives are upper-division MET courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled "Transfer Students" and "Admission to Baccalaureate Programs." The Bachelor of Science in Mechanical Engineering Technology requires 190 credit hours as prescribed in the following curriculum outline.

# Bachelor of Science in Mechanical Engineering Technology

## Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
CHE 101/201	Chemistry	3	ENGR 236	Fundamentals of Electric Circuits	3
CHE 104/204	Chemistry Laboratory	1	ENGR 266	Computer Programming for Engineers	3
MATH 111	College Algebra	4	MET 315	Machine Design I	3
MET 111	Orientation I	2	MET 360	Materials II	3
WRI 121	English Composition	3	MET 363	Instrumentation	3
	Psychology elective*	3	<b>Total</b>		<b>15</b>
<b>Total</b>		<b>16</b>			

Freshman Year		Winter	Junior Year		Winter
MATH 112	Trigonometry	4	ENGR 212	Engineering Mechanics: Dynamics	3
MET 112	Orientation II	2	ENGR 355	Thermodynamics***	3
MFG 103	Introductory Welding Processes	3	MET 316	Machine Design II	3
WRI 122	Argumentative Writing	3	MET 375	Solid Modeling	3
	Social Science elective	3		Social Science elective	3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>15</b>

Freshman Year		Spring	Junior Year		Spring
MATH 251	Differential Calculus	4	MET 313	Applied Thermodynamics	3
MFG 120	Manufacturing Processes I	4	MGT 445	Project Management	3
SPE 111	Public Speaking	3	Or		
	Economics elective	3	ENGR 445	Engineering Project Management	
	Humanities elective	3	MET 351	Finite Element Analysis	3
<b>Total</b>		<b>17</b>	MFG 314	Geometric Dimensioning and Tolerancing	3
				Humanities elective	3
			<b>Total</b>		<b>15</b>

Sophomore Year		Fall	Senior Year		Fall
MATH 252	Integral Calculus	4	MGT 345	Engineering Economy	3
MET 160	Materials I	3	MET 323	Heat Transfer I	3
MET 241	CAD for Mechanical Design I	2	MET 326	Electric Power Systems	3
PHY 201/221	General Physics	4	MET 490	Senior Projects I	3
WRI 227	Technical Report Writing	3		MET elective	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>15</b>

Sophomore Year		Winter	Senior Year		Winter
ENGR 211	Engineering Mechanics: Statics**	4	MET 426	Fluid Power Systems	3
MATH 254N	Vector Calculus I	4	MET 437	Heat Transfer II	2
MET 242	CAD for Mechanical Design II	2	MET 491	Senior Projects II	3
MFG 112	Introduction to Manufacturing Processes	3	SPE 321	Small Group and Team Communication	3
PHY 202/222	General Physics	4	WRI 327	Advanced Technical Writing	3
<b>Total</b>		<b>17</b>		MET elective	3
			<b>Total</b>		<b>17</b>

Sophomore Year		Spring	Senior Year		Spring
ENGR 213	Engineering Mechanics: Strength of Materials**	4	MET 492	Senior Projects III	3
MATH 361	Statistical Methods I	4	MFG 331	Industrial Controls	3
MET 218	Fluid Mechanics	4		Engineering Exam****	1
PHY 203/223	General Physics	4		Humanities elective	3
<b>Total</b>		<b>16</b>		MET elective	3
				MET elective	3
			<b>Total</b>		<b>16</b>

\* PSY 201 Recommended

\*\* ENGT 230, ENGT 231, ENGT 232 sequence may be substituted for the ENGR 211, ENGR 213 sequence

\*\*\* MET 232 Thermodynamics may be substituted for ENGR 355 Thermodynamics

\*\*\*\* Engineering Exam to be selected from:

- ENGR 485 Fundamentals of Engineering Exam
- MFG 428 Manufacturing Engineering Certification

*Total credits required for B.S. in Mechanical Engineering Technology: 190*

# Mathematics Department

Cristina Negoita, *Department Chair*

Jim Ballard, *Scheduling Coordinator*

Tiernan Fogarty, *Advising Coordinator*

*Professors:* B. Cornelius, J. Fischer, T. Thompson

*Associate Professors:* J. Ballard, T. Fogarty, C. Negoita, R. Paul, G. Waterman

*Assistant Professors:* J. Reid, T. Torres

## General Education

Courses offered by the Department of Mathematics are designed to satisfy the needs of majors and non-majors interested in mathematics primarily as part of a broad technical education. A major emphasis is on development of skills required to solve applied problems.

Success in mathematics requires that entering students begin their study in the course which best matches their ability and background. Accordingly, all entering students must pass a placement examination at the appropriate level before being allowed to register for their initial mathematics course.

## Degree Offered

Bachelor of Science in Applied Mathematics

## Minor Offered

Applied Mathematics

## Program Objectives

Coursework for the bachelor's degree is intended to provide a solid foundation of mathematical theory and a broad selection of applied work both in and outside mathematics. The prospective major will complete coursework in calculus, differential equations and numerical methods. Students also take a sequence of introductory physics courses and a further sequence in a technical field outside mathematics.

## Career Opportunities

Upon completing the requirements for the Applied Mathematics degree students will be prepared for a variety of jobs in industry including numerical modeling, signal processing, data analysis, and many others. The degree also provides students a sufficient background to further their education by entering a Masters or Ph.D. program in Mathematics or Applied Mathematics.

## Student Preparation

Students entering the Applied Mathematics Program from high school should have a minimum of two years of algebra, one year of pre-calculus, one year of geometry, and two years of physical science (physics or chemistry preferred). Additional courses in mathematics, science, English and computer programming will be very helpful. Students entering the Applied Mathematics Program by transfer are requested to contact the Mathematics Department concerning transfer of technical course work.

## Degree Requirements

In addition to the mathematics requirements listed below, students will be required to complete the 200 level calculus-based general physics sequence as well as other general education requirements and electives necessary to bring the total credit hours to 182. Please see the recommended curriculum map below.

All mathematics courses must be completed with a grade "C" or better. Transfer students should consult the Admissions Office and the Mathematics Department to determine which of their courses will satisfy Oregon Tech course requirements.

### Lower-Division Required Courses (18 credits)

MATH 221 Introduction to Computational Software  
MATH 251 - MATH 254N Calculus Sequence

### Upper-Division Core Requirements (43 credits)

MATH 311 Introduction to Real Analysis  
MATH 327 Discrete Mathematics  
MATH 321-322 Applied Differential Equations I, II  
MATH 341 Linear Algebra I  
MATH 354 Vector Calculus II  
MATH 361 Statistical Methods I  
MATH 421 Applied Partial Differential Equations I  
MATH 451 Numerical Methods I

### Plus two additional courses chosen from:

MATH 422 Applied Partial Differential Equations II  
MATH 423 Applied Partial Differential Equations III  
MATH 452 Numerical Methods II  
MATH 453 Numerical Methods III

### Upper-Division Math/Physics Electives (At least 7 credits)

Students will choose 2 upper-level mathematics or physics courses with the approval of a mathematics advisor. No more than 3 credits can be MATH 407.

### Focused Electives (16 credits)

Students will choose appropriate electives from outside of mathematics. These courses should support the program objectives and must be approved by a mathematics advisor. The focused electives must total at least 16 credits at least 9 of which are from a 3 course sequence; see below for examples.

### Examples of Focused Electives Sequences

- CST 116, 126, 223 Programming Languages
- CHE 221, 222, 223 General Chemistry
- ENGR 211, 212, 213 Engineering Mechanics: Statics, Dynamics, Strength of Materials
- PHY 311, 312, 313 Introduction to Modern Physics

### Examples of Focused Electives

- CST 313 Computer Software Techniques
- CHE 331, 332, 333 Organic Chemistry
- EET 371 LaPlace Transforms and Applications
- ENGR 318 Engineering Mechanics: Fluids
- ENGR 236 Fundamentals of Electric Circuits
- PSY 361 Industrial Psychology
- RDSC 356 Magnetic Resonance

### Notes:

1. Some of the above courses have an additional lab requirement.
2. PHY 221, 222, 223 may not be used as focused electives.

## Bachelor of Science in Applied Mathematics Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>	<u>Junior Year</u>		<u>Winter</u>
MATH 251	Differential Calculus	4	MATH 311	Introduction to Real Analysis	4
SPE 111	Public Speaking	3	WRI 227	Technical Report Writing	3
WRI 121	English Composition	3		Focused elective*	3
	Social Science elective	3		Elective (upper-division)	3
	Elective	3		Elective	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>16</b>
<u>Freshman Year</u>		<u>Winter</u>	<u>Junior Year</u>		<u>Spring</u>
MATH 252	Integral Calculus	4	MATH 322	Applied Differential Equations II	4
MATH 221	Introduction to Computational Software	2	MATH 451	Numerical Methods I	4
PHY 221	General Physics with Calculus	4		Focused elective*	3
WRI 122	Argumentative Writing	3		Math/Physics elective **	3
	Social Science elective	3		Elective	2
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>16</b>
<u>Freshman Year</u>		<u>Spring</u>	<u>Senior Year</u>		<u>Fall</u>
MATH 253N	Sequences and Series	4	MATH 421	Applied Partial Differential Equations I	4
PHY 222	General Physics with Calculus	4		Focused elective *	4
	Humanities elective	3		Math/Physics elective **	4
	Social Science elective	3		Elective	3
<b>Total</b>		<b>14</b>	<b>Total</b>		<b>15</b>
<u>Sophomore Year</u>		<u>Fall</u>	<u>Senior Year</u>		<u>Winter</u>
MATH 254N	Vector Calculus I	4	MATH	Mathematics Core (upper-division) ***	4
MATH 327	Discrete Mathematics	4		Focused elective *	3
PHY 223	General Physics with Calculus	4		Social Science elective	3
	Elective	3		Elective	3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>16</b>
<u>Sophomore Year</u>		<u>Winter</u>	<u>Senior Year</u>		<u>Spring</u>
MATH 341	Linear Algebra I	4	MATH	Mathematics Core (upper-division) ***	4
MATH 354	Vector Calculus II	4		Focused elective *	3
	Humanities elective	3		Social Science elective	3
	Elective	4		Elective	3
<b>Total</b>		<b>15</b>	<b>Total</b>		<b>16</b>
<u>Sophomore Year</u>		<u>Spring</u>	<u>Senior Year</u>		<u>Spring</u>
MATH 361	Statistical Methods I	4	WRI 327	Advanced Technical Writing	3
	Humanities elective	3	or		
	Elective	3	WRI 350	Documentation Development	3
	Elective	3		Elective	3
	Elective	3		Elective	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>13</b>
<u>Junior Year</u>		<u>Fall</u>			
MATH 321	Applied Differential Equations I	4			
SPE 321	Small Group and Team Communication	3			
	Focused elective *	3			
	Elective (upper division)	4			
<b>Total</b>		<b>14</b>			

\* Students will choose at least 16 credits from outside of mathematics with the approval of a mathematics advisor. At least 9 credits should be from a 3 course sequence. See above for examples.

\*\* Students will choose 2 upper-division courses from mathematics or physics with the approval of a mathematics advisor.

\*\*\* See "Upper-Division Core Requirements" listed above in the degree requirements section. The years and terms that these courses are offered will vary. For questions about availability, please consult with an advisor or contact the Mathematics Department.

**Total credits required for B.S. in Mathematics: 182**

## Applied Mathematics Minor

The minor in Applied Mathematics provides formal recognition of mathematical proficiency. It is composed of a core of required courses and upper-division electives related to the student's major. The minor consists of 29 credits, 19 from required courses and 10 from elective courses.

This minor is open to all majors and is especially recommended for students with an interest in pursuing a career related to mathematics. It will enhance their employability and improve graduate school possibilities.

### Curriculum

1. Required courses: MATH 251, MATH 252, MATH 253N, MATH 254N and MATH 341, plus 10 additional upper-division mathematics credits selected from the list below.
2. A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor.
3. At least 12 credits must be taken at Oregon Tech.

Students are required to consult an advisor from the Mathematics Department to select upper-division mathematics courses that would be most applicable to their major and/or career goals.

### Upper-Division Electives:

MATH 311 Introduction to Real Analysis  
 MATH 321 Applied Differential Equations I  
 MATH 322 Applied Differential Equations II  
 MATH 327 Discrete Mathematics  
 MATH 342 Linear Algebra II  
 MATH 346 Number Theory  
 MATH 347 Fundamentals of Abstract Algebra  
 MATH 354 Vector Calculus II  
 MATH 362 Statistical Methods II  
 MATH 421 Applied Partial Differential Equations I  
 MATH 422 Applied Partial Differential Equations II  
 MATH 423 Applied Partial Differential Equations III  
 MATH 425 Vector Analysis  
 MATH 451 Numerical Methods I  
 MATH 452 Numerical Methods II  
 MATH 453 Numerical Methods III  
 MATH 465 Mathematical Statistics

Note: Not all courses are offered every term or every year

## Applied Statistics Minor

The Minor in Applied Statistics is open to students in all majors and is specifically recommended for those students who wish to pursue graduate school or work in research. Students pursuing the minor will have enhanced statistical skills and a deeper understanding of statistics than what is received in one or two introductory courses. A minimum of 18 credits is required to complete this minor, 8 credits from required courses and 10 credits from elective courses.

### Curriculum list

A minimum of 18 credits (all earned with grade of “C” or above) is required to earn the minor.

1. Required courses: MATH 361 and MATH 362 (Statistical Methods I and II). In addition, at least 10 more credits of upper-division courses are needed from the lists below. Note that at least 4 credits of those must come from MATH/STAT courses listed below.
2. At least 12 credits must be taken at Oregon Tech.

Students are advised to consult an advisor from the Mathematics Department of select upper-division mathematics courses that would be most applicable to their major and/or career goals.

### Courses

#### Upper-Division MATH/STAT Electives (at least 4 credits)

MATH 465 Mathematical Statistics  
 STAT 413 Categorical Data Analysis  
 STAT 431 Sampling Methods  
 STAT 412 Regression and Time Series  
 STAT 415 Design and Analysis of Planned Experiments  
 STAT 414 Epidemiological Research Methods

#### Additional Courses (at most 6 credits)

BIO 434 Data Analysis Methods  
 BUS 456 or 457  
     Business Research Methods I or II  
 COMM 326 Communication Research  
 GME 444 Adjustment by Least Squares  
 MFG 333 Statistical Methods for Quality Improvement  
 MGT 461, 462 or 463  
     Lean Management I, II or III  
 PSY 313 or 314  
     Psychological Research Methods I or II

Note: Not all courses are offered every term or every year.

# Medical Imaging Technology Department

LeAnn Maupin, *Department Chair*

Robyn Cole, *Diagnostic Medical Sonography Program Director and Clinical Coordinator*

Barry Canaday, *Echocardiography Program Director and Clinical Coordinator*

Richard Hoylman, *Nuclear Medicine Technology Program Director and Clinical Coordinator*

Don McDonnell, *Radiologic Science Program Director and Clinical Coordinator*

Chris Caster, *Vascular Technology Program Director and Clinical Coordinator*

Janette Isaacson, *Vascular Technology and Echocardiography Degree Completion Program Director*

Gary Zimmerman, *Radiologic Science Degree Completion Program Director*

Robyn Cole, *Diagnostic Medical Sonography Degree Completion Program Director*

*Professors:* J. Kellstrom, L. Maupin, D. McCollam, T. McVay, S. Schultz, G. Zimmerman

*Associate Professors:* C. Caster, R. Cole, R. Hoylman

*Assistant Professors:* B. Canaday, D. McDonnell

*Instructors:* V. Bennett, R. Carson, T. Graham, T. Guthrie, B. Kowash, S. Templeton

*Participating Faculty:* J. Isaacson (Distance Education)

## Degrees Offered

Bachelor of Science in Diagnostic Medical Sonography

Bachelor of Science in Echocardiography

Bachelor of Science in Nuclear Medicine Technology

Bachelor of Science in Radiologic Science

Bachelor of Science in Vascular Technology

## Specialization Offered

Picture Archiving and Communication Systems (PACS)

## Department Objectives

The objectives of the Medical Imaging Technology Department are:

1. To prepare students to become effective participants in the medical imaging professions.
  2. To provide the residents of Oregon and the Pacific Northwest with Bachelor of Science degrees in Medical Imaging Technology.
- To prepare students for professions that require critical-thinking and problem solving skills.
4. To instill an effective influence of professional character, the knowledge and experience to pass the National Registry exams.
  5. To instill lifelong learning.

## Accreditation

Oregon Institute of Technology is accredited by Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

## Program Descriptions

The Department of Medical Imaging Technology offers bachelor's degrees in five professional programs, which encompass the spectrum of imaging sciences. The curriculum of each bachelor's degree program provides the technical, scientific, and communication skills essential for the application of learned concepts. Each program prepares students for immediate employment and for successfully passing the national and state registry examinations in each field.

*Diagnostic Medical Sonography: (also called sonography, ultrasound, or general ultrasound).* Sonography uses high frequency sound wave imaging and Doppler instrumentation to aid in the diagnosis of pathology and disease processes. The sonographer gathers pertinent patient history, creates images, and submits preliminary findings to the reading physician. Common exams include: obstetric, gynecological, peritoneal, retroperitoneal, pelvic, thoracic, musculoskeletal, extremity, neurological, and superficial procedures.

Invasive applications are also performed in most clinical settings.

### *Echocardiography*

Echocardiography is a safe method of obtaining ultrasound images for diagnosis of cardiac pathology in adult and pediatric patient populations. Echocardiographers conduct patient interviews, compile health histories and determine risk assessments pertaining to cardiovascular disease. The echocardiographer reports pertinent findings to the physician as part of the diagnostic process.

### *Nuclear Medicine Technology*

Nuclear medicine is an imaging science that demonstrates pathology through physiologic processes, as opposed to detailed anatomic images. This branch of imaging science has been in existence for over four decades, and provides unique diagnostic information obtained by the patient's ingestion, inhalation, or being injected with a radioactive isotope.

### *Radiologic Science*

This program has been in existence at Oregon Tech for more than 50 years. The training prepares the future radiologic technologist with a wide variety of skills, including radiography, fluoroscopy, mobile and surgical radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Mammography, Cardiovascular Interventional Technology (CIT), Quality Assurance, and imaging department management.

### *Vascular Technology*

Vascular technology is a profession which utilizes ultrasound, Doppler, color Doppler and various physiologic testing procedures to aid in the diagnosis of disease of the vascular system. Vascular technologists conduct patient interviews, compile health histories and determine risk assessments pertaining to vascular disease. The technologists choose appropriate testing modalities and provide referring physicians with preliminary interpretation of results.

## Facilities

Oregon Tech's state-of-the-art imaging equipment allows medical imaging students to become familiar with a wide variety of imaging procedures like those performed in most medical centers. Students may also spend

significant time at Sky Lakes Medical Center where they will gain experience directly with patients, prior to externship. This experience plus the academic coursework prepares the student well for the medical imaging professions.

## Externships

All five of the bachelor's degree programs in medical imaging culminate in a senior year of clinical externship at a medical center. The 11-month externship is spent at the affiliate institution under the supervision of a clinical instructor. Students do not have classes on the Oregon Tech campus during this year.

All imaging students must have a current American Heart CPR card during the entire extern year. The imaging department will provide an opportunity for the student to receive this certification during the junior year. There is an additional fee for this certification.

The location of externship will be determined by a lottery conducted by medical imaging faculty.

All students will be guaranteed an externship subject to the following:

1. All academic requirements must be met before externship assignments will be made.
2. Students will be required to pass a drug test prior to acceptance by the externship site.
3. Students must complete a request for criminal history which is required by many of the sites for persons providing care to children or the developmentally disabled.

## Admission Requirements

### Pre-Medical Imaging

#### Technology: Freshman Year

Enrollment is open to all students who meet the general entry requirements to the university. Students will be listed as Pre-Medical Imaging Technology (Pre-MIT) students. Admittance to the Oregon Tech Pre-MIT Program does not mean the student has been accepted into a specific MIT program.

#### Program Selection Criteria

Students must complete all the courses, including general education, in the specified freshman year (pre-medical imaging) curriculum. Selection will be made at the end of the spring term of the pre-medical imaging technology year. The number of students selected each year will be determined by the number of qualified applicants, and by the availability of clinical sites. Therefore, the number of qualified applicants may exceed the number of spaces available. Prior acceptance does not guarantee future acceptance into any MIT Program. Students must reapply yearly.

Selection will be based upon the following criteria and point system:

1. <b>GPA:</b> Students must have a total of a 2.75 <b>weighted</b> GPA (though a 3.0 is highly recommended), in the following courses (or equivalent transfer courses) to apply to one of the five MIT Programs.	
BIO 200 Medical Terminology	2
BIO 231 Human Anatomy and Physiology I	4
BIO 232 Human Anatomy and Physiology II	4
BIO 233 Human Anatomy and Physiology III	4
CHE 101 Elementary Chemistry	3
CHE 104 Elementary Chemistry Lab	1
MATH 112 Trigonometry	4
MIT 103 Introduction to Medical Imaging	3

GPA points are calculated as  $GPA \times 10$ . (For example, a 3.5  $GPA \times 10 = 35$ ). To determine how to calculate weighted GPA, see website at [www.oit.edu/mit](http://www.oit.edu/mit).

2. All applicants must attend an Oregon Tech hosted selection event on a specific date during spring term. Several activities are conducted during this event to allow students to demonstrate communication skills, team skills, writing skills, problem solving skills and professional-

ism. Faculty from the MIT Department, industry leaders and other Oregon Tech department members are present at the selection event to evaluate those skills.

## Application Requirements

Applications are available on the MIT website at [www.oit.edu/mit](http://www.oit.edu/mit).

A copy of transcripts (unofficial) must be attached to the application. Incomplete applications will not be accepted. There are no refunds of the application fee. Repeat applicants must follow the same procedures as first-time applicants. Contact the selection chairman for a new application.

The application form allows ranking of programs by choice (first and second) and only one application per student will be accepted. If multiple applications are received, they will be returned along with the application fees.

For current selection information refer to the Oregon Tech Medical Imaging Technology (MIT) web site at [www.oit.edu/mit](http://www.oit.edu/mit).

## Transfer Students

Transfer students who meet the academic requirements of the pre-medical imaging technology year will not find a course at another college which substitutes for MIT 103 Introduction to Medical Imaging. This course may be taken as a distance learning course. It must be completed in the summer, fall, winter or spring term prior to the application to a professional program. The MIT application form is included in the MIT 103 course. Transfer students must apply to both Oregon Tech and MIT using two separate application processes. For more information on this distance course, contact Diana Evans at (541) 885-1676.

## Graduation Requirements

All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled. Total credits required for graduation are: Diagnostic Medical Sonography 195, Echocardiography 198, Nuclear Medicine Technology 196, Radiologic Science 202 and Vascular Technology 200.

Students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all professional courses (DMS, ECHO, NMT, RDSC, VAS), communication courses, and science/mathematics courses to continue in

the program. All curricular requirements must be met within five academic years once the student is admitted into a professional program as a sophomore.

When a student unsuccessfully attempts an imaging course, progress in the professional curriculum is curtailed until that course is successfully completed the following year, pending reinstatement. However, if the student has an unsuccessful attempt fall term, sophomore year, they must reapply to the program. If the student has an unsuccessful attempt after fall term sophomore year the student must submit a letter of intent to the program director of the specific program they seek to re-enter. The letter must be submitted at least one term prior to re-admittance. Re-admittance may also depend upon other requirements such as auditing courses, attending labs, and/or remedial work as specified by the program director.

When students attempt unsuccessfully a second time the same or a different imaging course, they are terminated from that program. Additionally, if a student receives a "D," "F" or "W" in two or more imaging courses in one term, they will be dismissed from that program. Students may apply for admittance to a second imaging program under the same application criteria as all other applicants. After two unsuccessful attempts to complete two different programs, students may not apply for a third program.

## Career Opportunities

There continues to be a high demand for bachelor's degree prepared medical imaging professionals. Graduates have excellent opportunities for employment in hospitals, clinics, private practice, state and federal agencies, and with appropriate experience, in supervision, education and industry.

# Bachelor of Science in Diagnostic Medical Sonography

## Curriculum

Required courses and recommended terms during which they should be taken:

### Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>15</b>

### Professional Courses

Sophomore Year		Fall
BIO 335	Cross-Sectional Anatomy *	3
DMS 223	Applications of Abdominal Sonography I *	3
DMS 252	Sophomore Laboratory I *	1
PHY 217	Physics of Medical Imaging	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Winter
DMS 224	Applications of Abdominal Sonography II *	3
DMS 235	Diagnostic Medical Sonography Patient Care*	3
DMS 253	Sophomore Laboratory II *	1
MIT 231	Sonographic Principles and Instrumentation I *	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>14</b>

Sophomore Year		Spring
DMS 225	Applications of Abdominal Sonography III *	3
DMS 234	Pelvic Sonography *	3
DMS 254	Sophomore Laboratory III *	1
MIT 232	Sonographic Principles and Instrumentation II *	4
	Social Science elective	3
<b>Total</b>		<b>14</b>

Junior Year		Fall
BUS 317	Health Care Management	3
DMS 315	Sonographic Superficial Structures *	3
DMS 352	Junior Laboratory I *	1
DMS 365	Sonographic Pathology *	3
DMS 371	Obstetrical Sonography First Trimester *	3
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>16</b>

Junior Year		Winter
BUS 316	Total Quality in Health Care	3
DMS 316	Survey of Vascular Technology *	3
DMS 342	Survey of Adult Echocardiography *	3
DMS 353	Junior Laboratory II *	1
DMS 372	Obstetrical Sonography Second/Third Trimester *	3
<b>Total</b>		<b>13</b>

Junior Year		Spring
DMS 343	Fetal Echo, Neonatal, and Pediatric Sonography *	3
DMS 354	Junior Laboratory III *	1
DMS 373	Obstetrical Pathology *	3
DMS 388	Externship Preparation *	2
	Communication elective **	3
	Humanities elective	3
<b>Total</b>		<b>15</b>

Senior Year		Summer
DMS 430	Diagnostic Medical Sonography Externship *	15
<b>Total</b>		<b>15</b>

Senior Year		Fall
DMS 430	Diagnostic Medical Sonography Externship *	15
<b>Total</b>		<b>15</b>

Senior Year		Winter
DMS 430	Diagnostic Medical Sonography Externship *	15
<b>Total</b>		<b>15</b>

Senior Year		Spring
DMS 430	Diagnostic Medical Sonography Externship *	15
<b>Total</b>		<b>15</b>

\* Core Imaging Courses

\*\* Courses listed under Communication requirements for General Education.

**Total credits required for B.S. in Diagnostic Medical Sonography**



## Bachelor of Science in Echocardiography

### Curriculum

Required Courses and recommended terms during which they should be taken:

#### Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>15</b>

### Professional Courses

Sophomore Year		Fall
BIO 220	Cardiovascular Physiology*	4
ECHO 320	Cardiographic Methods*	3
PHY 217	Physics of Medical Imaging*	3
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>13</b>

Sophomore Year		Winter
BIO 346	Pathophysiology I*	3
ECHO 231	Echocardiography I*	4
MIT 231	Sonographic Principles and Instrumentation I*	4
	Social Science elective	3
<b>Total</b>		<b>14</b>

Sophomore Year		Spring
BIO 347	Pathophysiology II*	3
ECHO 225	Cardiopulmonary Patient Management Practices*	3
ECHO 232	Echocardiography II*	4
ECHO 332	Invasive Cardiology*	3
MIT 232	Sonographic Principles and Instrumentation II	4
<b>Total</b>		<b>17</b>

Junior Year		Fall
BUS 317	Health Care Management	3
ECHO 333	Echocardiography III*	4
ECHO 321	Stress and Transesophageal Echo*	3
SPE 321	Small Group and Team Communication	3
	Humanities elective	3
<b>Total</b>		<b>16</b>

Junior Year		Winter
BUS 316	Total Quality in Health Care	3
CHE 360	Clinical Pharmacology for the Health Professions*	3
ECHO 325	Pediatric Echocardiography*	3
ECHO 376	Survey of Vascular Testing* Social Science elective	3
<b>Total</b>		<b>15</b>

Junior Year		Spring
ECHO 334	Echocardiography IV*	4
ECHO 385	Echocardiography Laboratory Management*	3
ECHO 388	Externship Preparation* Communication elective	3
	Humanities elective	3
<b>Total</b>		<b>16</b>

Senior Year		Summer
ECHO 420	Echocardiography Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Fall
ECHO 420	Echocardiography Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Winter
ECHO 420	Echocardiography Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Spring
ECHO 420	Echocardiography Externship*	15
<b>Total</b>		<b>15</b>

\* Core Imaging Courses  
\*\* Courses listed under Communication requirement for General Education.

**Total credits required for B.S. in Echocardiography:**  
198

## Bachelor of Science in Nuclear Medicine Technology

### Curriculum

Required courses and recommended terms during which they should be taken:

#### Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>15</b>

### Professional Courses

Sophomore Year		Fall
CHE 350	Clinical Pharmacology for Nuclear Medicine *	3
NMT 212	Nuclear Medicine Physics/ Radiation Biophysics *	3
NMT 217	Patient Care *	4
PHY 217	Physics of Medical Imaging *	3
<b>Total</b>		<b>13</b>

Sophomore Year		Winter
NMT 205	Nuclear Medicine Administration *	2
NMT 215	Radiochemistry and Radiopharmacy *	4
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>12</b>

Sophomore Year		Spring
BUS 316	Total Quality in Health Care	3
NMT 225	Nuclear Physics/Instrumentation *	4
NMT 256	Cardiovascular Imaging *	3
	Communication elective **	3
	Humanities elective	3
<b>Total</b>		<b>16</b>

## Bachelor of Science in Radiologic Science Curriculum

Required courses and recommended terms during which they should be taken:

### Pre-Medical Imaging Technology

Junior Year		Fall
BUS 317	Health Care Management	3
NMT 311	Imaging Procedures I *	4
NMT 346	Magnetic Resonance *	4
NMT 367	PET Imaging *	3
<b>Total</b>		<b>14</b>

Junior Year		Winter
BIO 335	Cross-Sectional Anatomy *	3
BIO 346	Pathophysiology I *	3
NMT 312	Imaging Procedures II *	4
NMT 355	Computed Tomography *	4
	Social Science elective	3
<b>Total</b>		<b>17</b>

Junior Year		Spring
NMT 313	Therapeutic Procedures and In-Vitro Studies *	4
NMT 325	SPECT Imaging and Computer Applications *	4
NMT 388	Externship Preparation *	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

Senior Year		Summer
NMT 410	Nuclear Medicine Technology Externship	15
<b>Total</b>		<b>15</b>

Senior Year		Fall
NMT 410	Nuclear Medicine Technology Externship *	15
<b>Total</b>		<b>15</b>

Senior Year		Winter
NMT 410	Nuclear Medicine Technology Externship *	15
<b>Total</b>		<b>15</b>

Senior Year		Spring
NMT 410	Nuclear Medicine Technology Externship *	15
<b>Total</b>		<b>15</b>

\* Core Imaging Courses

\*\* Courses listed under Communication requirement for General Education.

*Total credits required for B.S. in Nuclear Medicine Technology: 196*

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>15</b>

### Professional Courses

Sophomore Year		Fall
RDSC 201	Imaging Techniques I *	4
RDSC 235	Equipment Operation and Maintenance *	3
WRI 227	Technical Report Writing	3
	Communication elective **	3
	Humanities elective	3
<b>Total</b>		<b>16</b>

Sophomore Year		Winter
RDSC 202	Imaging Techniques II *	4
RDSC 205	Patient Care *	4
RDSC 210	Radiographic Positioning I *	4
RDSC 366	Radiographic Pathology *	3
<b>Total</b>		<b>15</b>

Sophomore Year		Spring
BIO 335	Cross-Sectional Anatomy	3
PHY 217	Physics of Medical Imaging	3
RDSC 211	Radiographic Positioning II *	4
RDSC 233	Contrast Media Procedures *	4
RDSC 272	Radiation Protection *	3
<b>Total</b>		<b>17</b>

Junior Year		Fall
BIO 336	Essentials of Pathophysiology	3
RDSC 301	Radiographic Positioning III *	4
RDSC 320	Surgical, Trauma and Mobile Radiography *	4
RDSC 355	Computed Tomography *	4
<b>Total</b>		<b>15</b>

Junior Year		Winter
BUS 316	Total Quality in Health Care	3
RDSC 356	Magnetic Resonance *	4
SPE 321	Small Group and Team Communication	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>16</b>

Junior Year S		pring
BUS 317	Health Care Management	3
RDSC 326	Cardiovascular/Interventional Technology *	4
RDSC 354	Mammography *	
or		
RDSC 365	Advanced Quality Assurance/Quality Control *	4
RDSC 388	Externship Preparation *	2
	Social Science elective	3
<b>Total</b>		<b>16</b>

Senior Year		Summer
RDSC 410	Radiologic Science Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Fall
RDSC 410	Radiologic Science Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Winter
RDSC 410	Radiologic Science Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Spring
RDSC 410	Radiologic Science Externship*	15
<b>Total</b>		<b>15</b>

\* Core Imaging courses

\*\* Courses listed under Communication requirement for General Education.

*Total credits required for B.S. in Radiologic Science: 202*

## Bachelor of Science in Vascular Technology Curriculum

Required courses and recommended terms during which they should be taken:

### Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>17</b>

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>15</b>

### Professional Courses

Sophomore Year		Fall
BIO 220	Cardiovascular Physiology*	4
PHY 217	Physics of Medical Imaging*	3
VAS 214	Vascular Anatomy*	4
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>14</b>

Sophomore Year		Winter
BIO 346	Pathophysiology I*	3
MIT 231	Sonographic Principles and Instrumentation I*	4
VAS 246	Peripheral Arterial Disease*	4
VAS 335	Radiographic Vascular Anatomy*	3
<b>Total</b>		<b>14</b>

Sophomore Year		Spring
BIO 347	Pathophysiology II*	3
MIT 232	Sonographic Principles and Instrumentation II*	4
VAS 225	Patient Management Practices*	3
VAS 245	Peripheral Venous Disease*	4
	Social Science elective	3
<b>Total</b>		<b>17</b>

Junior Year		Fall
BUS 317	Health Care Management	3
SPE 321	Small Group and Team Communication	3
VAS 337	Survey of Echocardiography*	3
VAS 365	Abdominal Vascular Disease*	4
	Social Science elective	3
<b>Total</b>		<b>16</b>

Junior Year		Winter
BUS 316	Total Quality in Health Care	3
CHE 360	Clinical Pharmacology for the Health Professions*	3
VAS 366	Special Circulatory Problems*	4
VAS 375	Survey of Abdominal Sonography*	3
	Humanities elective	3
<b>Total</b>		<b>16</b>

Junior Year		Spring
VAS 367	Cerebrovascular Disease*	4
VAS 385	Vascular Laboratory Management*	3
VAS 388	Externship Preparation	3
	Communication elective**	3
	Humanities elective	3
<b>Total</b>		<b>16</b>

Senior Year		Summer
VAS 420	Vascular Technology Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Fall
VAS 420	Vascular Technology Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Winter
VAS 420	Vascular Technology Externship*	15
<b>Total</b>		<b>15</b>

Senior Year		Spring
VAS 420	Vascular Technology Externship*	15
<b>Total</b>		<b>15</b>

\* Core Imaging courses

\*\* Courses listed under Communication requirement for General Education.

**Total credits required for B.S. in Vascular Technology:**  
190

## Picture Archiving and Communication Systems (PACS) Specialization

Medical Imaging Technology students with an interest and aptitude in computer science have a unique opportunity at Oregon Tech. Networked digital imaging has created the need for technologists with specialized training. Career opportunities for managers of image networks are on the rise, but few working technologists have the training to prepare them for entering this field.

With the availability of Computer Systems and Management Information Systems majors at Oregon Tech, a specialization in Picture Archiving and Communication Systems (PACS) is available for motivated students to pursue this opportunity.

### Requirements of the Specialization

MIT 260	Introduction to PACS	3
MIT 333	HIPAA for PACS/HI	3
MIT 361	Advanced PACS	3
MIT 362	PACS Networking	3
MIT 363	PACS DBMS	3
MIT 374	Quality Assurance of Medical Images	3

Students must earn a "C" or better in all courses to be awarded the specialization.

### Degree Completion Programs

The Echocardiography, Radiologic Science and Vascular Technology and Diagnostic Medical Sonography programs offer degree completion programs for registered technologists (in good standing) who wish to pursue a bachelor's degree in their field. These programs are fully online. There is no requirement to come to campus.

### Bachelor's Degree Completion Diagnostic Medical Sonography Admission Procedures

1. Complete the *Distance Education Application for Admission* and the appropriate *Statement of Acknowledgment* for this program.
2. Mail your application, a copy of your registry certificate, a check for \$100 (payable to Oregon Institute of Technology) and the signed *Statement of Acknowledgment*, to the Distance Education Office.

3. Mail official transcripts from all colleges you have attended to the Distance Education Office.
4. Request a letter of good standing from ARDMS be mailed to the Distance Education Office. This letter will enable the University Registrar to grant college credit based on your registry.

### Courses granted for Registry

DMS 223	Applications of Abdominal Sonography I	3
DMS 224	Applications of Abdominal Sonography II	3
DMS 225	Applications of Abdominal Sonography III	3
DMS 234	Pelvic Sonography	3
DMS 235	Diagnostic Medical Sonography Patient Care	3
DMS 252	Sophomore Laboratory I	1
DMS 253	Sophomore Laboratory II	1
DMS 254	Sophomore Laboratory III	1
DMS 371	Obstetrical Sonography First Trimester	3
DMS 372	Obstetrical Sonography Second/Third Trimester	3
DMS 388	Externship Preparation (waived)	0
DMS 430	Diagnostic Medical Sonography Externship	45
MIT 103	Introduction to Medical Imaging	3
MIT 231	Sonographic Principles and Instrumentation I	4
MIT 232	Sonographic Principles and Instrumentation II	4
PHY 217	Physics of Medical Imaging	3
<b>Total</b>		<b>83</b>

### Oregon Tech Degree Completion Credits

BIO 335	Cross-Sectional Anatomy	3
BUS 316	Total Quality in Health Care	3
BUS 317	Health Care Management	3
DMS 315	Sonographic Superficial Structures	3
DMS 316	Survey of Vascular Technology *	3
DMS 342	Survey of Adult Echocardiography	3
DMS 343	Fetal Echo, Neonatal and Pediatric Sonography	3
DMS 352	Junior Laboratory I	1
DMS 353	Junior Laboratory II	1
DMS 354	Junior Laboratory III	1
DMS 365	Sonographic Pathology	3
DMS 373	Obstetrical Pathology	3
DMS 430A	Diagnostic Medical Sonography Externship	8
DMS 430B	Diagnostic Medical Sonography Externship	7
SPE 321	Small Group and Team Communication	3
	Communication elective	3
<b>Total</b>		<b>51</b>

### Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202, PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities electives	9
	Social Science electives	12
	Elective	2
<b>Total</b>		<b>64</b>

\* Credits may be granted for additional specialty registry exams. Please contact Program Director for more information.

### Bachelor's Degree Completion

#### Echocardiography

#### Admission Procedures

1. Complete the *Distance Education Application for Admission* and the appropriate *Statement of Acknowledgment* for this program.
2. Mail your application, a copy of your registry certificate, a check for \$100 (payable to Oregon Institute of Technology) and the signed *Statement of Acknowledgment* to the Distance Education Office.
3. Mail official transcripts from all colleges you have attended to the Distance Education Office.
4. Request a letter of good standing from ARDMS/CCI be mailed to the Distance Education Office. This letter will enable the University Registrar to grant college credit based on your registry.

### Courses granted for Registry

BIO 220	Cardiovascular Physiology	4
BIO 346	Pathophysiology I	3
BIO 347	Pathophysiology II	3
ECHO 225	Cardiopulmonary Patient Management Practices	3
ECHO 231	Echocardiography I	4
ECHO 232	Echocardiography II	4
ECHO 320	Cardiographic Methods	3
ECHO 321	Stress and Transesophageal Echo	3
ECHO 333	Echocardiography III	4
ECHO 420	Echocardiography Externship	45
MIT 103	Introduction to Medical Imaging	3
MIT 231	Sonographic Principles and Instrumentation I	4

MIT 232	Sonographic Principles and Instrumentation II	4
PHY 217	Physics of Medical Imaging	3
<b>Total</b>		<b>90</b>

### Oregon Tech Degree Completion

#### Courses

BUS 316	Total Quality in Health Care	3
BUS 317	Health Care Management	3
CHE 360	Clinical Pharmacology for the Health Professions	3
ECHO 325	Pediatric Echocardiography *	3
ECHO 332	Invasive Cardiology	3
ECHO 334	Echocardiography IV	4
ECHO 365	Abdominal/Renal Testing	4
ECHO 376	Survey of Vascular Testing *	3
ECHO 385	Echocardiography Laboratory Management	3
ECHO 420A	Echocardiography Externship	8
ECHO 420B	Echocardiography Externship	7
ECHO 421	Echo Senior Project	4
SPE 321	Small Group and Team Communication	3
	Communication elective	3
<b>Total</b>		<b>54</b>

\* Optional credits may be awarded for additional registries.

### Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities electives	9
	Social Science electives	9
	Elective	3
<b>Total</b>		<b>62</b>

### Bachelor's Degree Completion

#### Radiologic Science Admission

#### Procedures

1. Complete the *Distance Education Application for Admission* and the appropriate *Statement of Acknowledgment* for this program.
2. Mail your application, an unofficial copy of your ARRT registry card, signed Affiliation Agreement and a check for \$100 (payable to Oregon Institute of Technology) to the Distance Education Office. A copy of your ARRT card

must accompany your application for Oregon Tech to begin processing the application. This document verifies your eligibility for admission to the program.

- Request that official transcripts from all colleges you have attended and an official copy of your ARRT registry documents be sent to the Distance Education Office. Official copies will enable Oregon Tech to grant college credit based on your credentials.

### Courses granted for Registry

MIT 103	Introduction to Medical Imaging	3
PHY 217	Physics of Medical Imaging	3
RDSC 201	Imaging Techniques I	4
RDSC 202	Imaging Techniques II	4
RDSC 205	Patient Care	4
RDSC 210	Radiographic Positioning I	4
RDSC 211	Radiographic Positioning II	4
RDSC 233	Contrast Media Procedures	4
RDSC 235	Equipment Operation and Maintenance	3
RDSC 272	Radiation Protection	3
RDSC 301	Radiographic Positioning III	4
RDSC 320	Surgical, Trauma and Mobile Radiography	4
RDSC 410	Radiologic Science Externship	45
<b>Total</b>		<b>89</b>

### Oregon Tech Degree Completion Courses

BIO 335	Cross-Sectional Anatomy	3
BIO 336	Essentials of Pathophysiology	3
BUS 316	Total Quality in Health Care	3
BUS 317	Health Care Management	3
RDSC 326	Cardiovascular/Interventional Technology *	4
RDSC 354	Mammography *	4
or		
RDSC 365	Advanced Quality Assurance/Quality Control	4
RDSC 355	Computed Tomography	4
RDSC 356	Magnetic Resonance	4
RDSC 366	Radiologic Pathology	3
RDSC 411	Special Radiologic Science Externship	15
SPE 321	Small Group and Team Communication	3
	Communication elective	3
<b>Total</b>		<b>52</b>

\* Optional credit may be awarded for additional registries.

### Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4

PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities electives	9
	Social Science electives	9
	Elective	2
<b>Total</b>		<b>61</b>

### Bachelor's Degree Completion

#### Vascular Technology

#### Admission Process

- Complete the *Distance Education Application for Admission* and the appropriate *Statement of Acknowledgment* for this program.
- Mail your application, a copy of your registry certificate, a check for \$100 (payable to Oregon Institute of Technology) and the signed *Statement of Acknowledgment* to the Distance Education Office.
- Request that official transcripts from all colleges you have attended to be sent to the Distance Education Office.
- Request a letter of good standing from ARDMS/CCI be mailed to the Distance Education Office. This letter will enable the University Registrar to grant college credit based on your registry.

#### Courses granted for Registry

BIO 346	Pathophysiology I	3
BIO 347	Pathophysiology II	3
MIT 103	Introduction to Medical Imaging	3
MIT 231	Sonographic Principles and Instrumentation I	4
MIT 232	Sonographic Principles and Instrumentation II	4
PHY 217	Physics of Medical Imaging *	3
VAS 214	Vascular Anatomy	4
VAS 225	Patient Management Practices	3
VAS 245	Peripheral Venous Disease	4
VAS 246	Peripheral Arterial Disease	4
VAS 367	Cerebrovascular Disease	4
VAS 420	Vascular Technology Externship	45
<b>Total</b>		<b>84</b>

Oregon Tech Degree Completion Credits		
BIO 220	Cardiovascular Physiology	4
BUS 316	Total Quality in Health Care	3
BUS 317	Health Care Management	3
CHE 360	Clinical Pharmacology for the Health Professions	3
SPE 321	Small Group and Team Communication	3
VAS 335	Radiographic Vascular Anatomy	3
VAS 337	Survey of Echocardiography	3
VAS 365	Abdominal Vascular Disease	4

VAS 366	Special Circulatory Problems	4
VAS 375	Survey of Abdominal Sonography *	3
VAS 385	Vascular Laboratory Management	3
VAS 420A	Special Vascular Technology Externship	8
VAS 420B	Special Vascular Technology Externship	7
	Communication elective	3
<b>Total</b>		<b>54</b>

\* Optional credit may be awarded for additional registries.

#### Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities electives	9
	Social Science electives	9
	Elective	3
<b>Total</b>		<b>62</b>

# Natural Sciences Department

Ken Usher, *Department Chair*

*Professors:* B. Burda, B. Clark, H.-Y. Li, T. McVay, M. O'Shaughnessy, E. Schechtel, R. Swisher, K. Usher

*Associate Professors:* R. Wilde

*Assistant Professors:* S. Anthony, M. Beekman, S. Bekker, M. Hughes, R. McClure, G. Pak, L. Parratt

## Degrees Offered

Bachelor of Science in Biology-Health Sciences

Bachelor of Science in Environmental Sciences

## Minor Offered

Biology

The Department of Natural Sciences prepares students for challenging, rewarding careers in health, biological, and environmental sciences. The department also provides courses in biology, chemistry, and physics in support of degrees in nursing, medical imaging, dental hygiene, respiratory care, management and engineering programs.

## Biology Program

Many students have an interest in biology. At Oregon Tech we have designed two programs that prepare graduates for rewarding careers that require a strong foundation in biology. For outdoor or field-oriented options, please refer to the Environmental Sciences program in our department. It offers several emphases including Watershed Science, that

can readily be tailored to biological interests and student research projects. Graduates from our Environmental Sciences program often go on to careers with public and private agencies such as US Fish and Wildlife Service, US Forest Service and the Nature Conservancy. For medically-oriented options in biology, please see our Biology-Health Sci-

ences program. It offers a strong preparation to apply to professional programs, exceeding the minimum requirements for highly competitive fields such as Medicine, Pharmacy, Dentistry, Veterinary Medicine, Physician Assistant, and others.

## Biology-Health Sciences Program

Burton Clark, *Program Director*

### Degree Offered

Bachelor of Science in Biology-Health Sciences

### Objective and Career Opportunities

If you are interested in pre-medical, pre-dental, pre-veterinary, pre-pharmacy, pre-physical therapy, etc., then this is the major you want. The degree program provides an intensive course of study in the basic sciences, social sciences, communication, and mathematics to prepare students for entry into professional programs. The program will meet prerequisite requirements for schools of medicine, dentistry, veterinary medicine, osteopathic medicine, optometry, pharmacy, and podiatry and for graduate programs in physical therapy and occupational therapy.

Courses in health management, medical microbiology, biochemistry, and molecular & cell biology also provide strong preparation for graduate work in biotechnology, public health, and medical administration. This major can also prepare one for a career in education with an emphasis in biology.

### Student Preparation

The Biology-Health Sciences curriculum is a demanding instructional program requiring considerable effort in science and mathematics coursework. Prospective students are advised to complete two to three years of high school mathematics and a minimum of three years of high school science (biology, chemistry, and physics).

### Degree Requirements

The minimum graduation requirement is 180 credit hours of prescribed coursework. Students must meet the general education

requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain a Bachelor of Science degree in Biology-Health Sciences. Biology-Health Sciences students must complete every science course with a minimum grade of "C" and must maintain a minimum grade point average of 2.5 in lower division science courses to advance to upper-division science courses in the major.

Because the prerequisite requirements and recommended courses for entry into health professions and graduate schools differ, some upper-division courses may be substituted for others, with approval of your academic advisor.



## Pre-Professional Program in Dentistry

Rose McClure, *Advising Coordinator*

The pre-professional program in dentistry prepares the student for entrance into dental school. While the requirements for admission to dental schools vary and some will accept students earlier, a bachelor's degree is highly encouraged for acceptance. In fact, 82% of first-year dental students have completed a four-year baccalaureate degree before starting dental school and 90% have four years of pre-dental college courses before acceptance. The curriculum at Oregon Institute of Technology provides the prerequisite courses for dental school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses.

Because the pre-dental requirements for each dental school vary slightly, it is suggested by sophomore year of college that students look at the requirements for several dental schools along with their dream school. It is also recommended that students do not use AP credit to fill prerequisites for dental school since most do not accept them. There are eight advisors in Oregon Tech's pre-dental program and it is encouraged that students work closely with the advisor they connect best with. The Biology – Health Sciences Program also urges students to begin volunteering in dental settings, possibly during high school and especially during college. For students still in high school, it is advisable to enroll in many sciences courses before college to help prepare for future success.

Admission to dental school is very competitive and requires strong academic achievement. Besides a strong college GPA and application, students must take the dental admission test (DAT) offered by the American Dental Association. The test measures a student's comprehension of scientific information and academic ability. Once accepted, it will take approximately four years to complete dental school.

For complete program requirements and a list

of appropriate courses, please see the Biology – Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology – Health Sciences.

## Pre-Professional Program in Medicine

Rose McClure, *Advising Coordinator*

This program prepares students for entrance into medical school and is often referred to as pre-med. The curriculum at Oregon Institute of Technology provides a pathway to complete all the prerequisites that medical schools like to see and more. There are eight advisors in the pre-med program and students are encouraged to work closely with the advisor they connect best with. Advisors guide students on courses selection, job or volunteer experience, and lead them through the medical school application process. Admission into medical school requires a four-year bachelor's degree with a preference for a science major over a non-science major. Once accepted, medical school then requires approximately four years of education and three to six years of internship and residency. More than 17,000 students enter medical school each year with half of the class being women.

Students are urged to volunteer in medical settings, possibly during high school and especially during college. For students currently in high school, it is advised that the student enrolls in many sciences courses before college to help them prepare for future success. It is recommended that students do not use AP credit to fill medical school prerequisites since they often do not accept them. Nonetheless, it is encouraged to take AP courses in high school since the rigor is excellent college preparation.

Students considering a career in medicine should explore the websites of the schools they have interest in as the prerequisites for each may vary. Students are suggested to read the Medical School Admissions Requirements (MSAR) published by the Association of American Medical Colleges. The pre-med program at Oregon Tech includes a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology, medical genetics, medical microbiology,

neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses. While the curriculum is very challenging, admission into medical school is highly competitive and requires strong academic achievement. The coursework at Oregon Tech helps students prepare for the medical college admission test (MCAT) required by nearly all medical schools. The test, which is divided into four sections includes physical sciences, biological sciences, verbal reasoning, and writing sample, is used to predict a student's ability to succeed academically.

For complete program requirements and a list of appropriate courses please see the Biology – Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology – Health Sciences.

## Pre-Professional Program in Pharmacy

Rose McClure, *Advising Coordinator*

A pharmacy degree normally takes four years to complete. Most first-year pharmacy students have completed four years of undergraduate education and possess a bachelor's degree in the sciences. One also must complete the prerequisites for the pharmacy school. The curriculum at Oregon Institute of Technology provides the prerequisite courses including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. Additional courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, statistics and English composition courses.

The pre-professional program in pharmacy at Oregon Tech has eight advisors and students are encouraged to work closely with the advisor they connect best with. Students are urged to begin volunteering in pharmacy settings, possibly during high school and especially during college. For students currently in high school, it is recommend to shadow and talk with pharmacists and to take many science courses before college to help prepare for future success.

The application process to pharmacy school



is done through the Pharmacy College Application Service (PharmCAS). Students are encouraged to look at their web site while also looking at the sites of schools they have an interest in. Some pharmacy schools require the Pharmacy College Admissions Test (PCAT). Oregon State University and the pharmacy schools in California do not. Admission to school is competitive so a strong undergraduate GPA, community service, and communications and leadership skills will help.

For complete program requirements and a list of appropriate courses please see the Biology – Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology – Health Sciences.

## Pre-Professional Program in Veterinary Medicine

Rose McClure, *Advising Coordinator*

The pre-professional program in veterinary medicine prepares students for entrance into veterinary school. There are twenty-eight veterinary schools in the United States and it is highly recommended that students visit the websites of the schools they are interested in. The prerequisites for each school vary slightly. There are eight advisors in the program and students should work closely with the advisor they connect best with.

Admission to veterinary school is competitive and requires a good undergraduate GPA in addition to shadowing or working with a veterinarian. Students are encouraged to work in a clinical practice, volunteer in an animal shelter, or work at a zoo or rehabilitation facility while completing their undergraduate courses. Students currently in high school should continue to take sciences courses and, if available, be involved in 4H or FFA. Advisors recommend that students do not use AP credit to fill prerequisites for veterinary school since most do not accept them.

Being a resident of a state that has a veterinary school is also a major advantage to being accepted since most schools take few out-of-state applicants. If the student's home state does not have a veterinary school, hopefully the state "buys" seats from a veterinary school in a neighboring state for its residents. The WICHE program in the western United

States allows out-of-state students to attend veterinary school at Colorado State University at Fort Collins, Oregon State University, Washington State University or the University of California at Davis veterinary schools for in-state tuition.

Many veterinary schools require students to take the general test of the Graduate Record Examination (GRE). It is offered monthly and is often taken in the junior year of undergrad. The majority of first-year veterinary student have completed their bachelor's degree at a four-year university.

The program at Oregon Institute of Technology offers the prerequisite courses (and more) for veterinary school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in wildlife rehabilitation, cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, English composition and public speaking courses. Business-related courses are also recommended.

For complete program requirements and a list of appropriate courses please see the Biology – Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology – Health Sciences.

## Biology Minor

For advising, see Ken Usher, Department Chair

The biology minor is open to all majors and is especially recommended for students who want to further their knowledge in biology as it relates to their chosen field. The minor offers specialized courses in biology and will document student proficiency in specific areas of biology. A minimum of 24 credits is required to complete the minor. Any substitution for elective courses must be approved by an advisor in the Natural Sciences Department. Students are advised to pay strict attention to prerequisites when selecting courses for the biology minor.

## Requirements of Minor

### Required core courses:

BIO 211 Principles of Biology  
BIO 212 Principles of Biology  
BIO 213 Principles of Biology

### And a minimum of 12 credits upper-division course work from the following list:

BIO 313 Botany\*  
BIO 317 Invertebrate Biology  
BIO 327 General Ecology \*  
BIO 331 Human Anatomy and Physiology I  
BIO 332 Human Anatomy and Physiology II  
BIO 333 Human Anatomy and Physiology III  
BIO 337 Aquatic Ecology \*  
BIO 341 Medical Genetics  
BIO 342 Cell Biology  
BIO 345 Medical Microbiology  
BIO 351 Vertebrate Biology  
BIO 352 Developmental Biology  
BIO 357 Introduction to Neuroscience  
BIO 426 Evolutionary Biology  
BIO 436 Immunology

\* Courses offered in alternating years.

# Environmental Sciences Program

Michael Hughes, *Program Director*

John Ritter, GIS Emphasis Coordinator

## Degree Offered

Bachelor of Science in Environmental Sciences

## Dual Major Options

Bachelor of Science in Civil Engineering and Environmental Sciences

*Advising Coordinator:* David Thaumert

Bachelor of Science in Renewable Energy Engineering and Environmental Sciences

*Advising Coordinator:* James Zipay

The Bachelor of Science degree in Environmental Sciences emphasizes the application of scientific reasoning and methodology to problems concerning: (1) environmental processes and patterns, and/or (2) abiotic-biotic interactions in ecosystems. Methodological training focuses on techniques – and instrumentation – in conjunction with GIS and geospatial analysis.

The program rests on three cores: a core of six lower-division courses in introductory environmental science, a basic sciences core of nine courses (one year each of biology, chemistry and physics), and a mathematics core of five courses, including differential and integral calculus and statistics. The program is by definition interdisciplinary and utilizes the practical knowledge and skills of faculty from a broad range of backgrounds and expertise.

Students may choose to concentrate in one of three technical emphasis areas; Watershed Science, Sustainable Technologies and Geographic Information Systems (GIS). Under the direction of an advisor, students may forego any one area and instead blend offerings from all three areas to create a more individually focused curriculum. The emphasis in Watershed Science focuses on the structure, processes, patterns, ecology, management, and restoration of terrestrial, riparian and aquatic ecosystems. Special attention is granted to the flows of energy and materials through these ecosystems, as well as human impacts on ecosystem functions. The emphasis in Sustainable Technologies focuses

on the characterization of environmental processes and patterns for application to the management, planning, and development of renewable resources, with special attention to water and renewable energy. The emphasis in GIS builds on the GIS core curriculum to advance student knowledge and skills in the application of geospatial concepts and technologies to problems in environmental sciences and natural resource management. The core curriculum and technical emphasis areas are supported by courses taught by faculty in the Natural Sciences Department and other departments and programs on campus, including Geomatics, Civil Engineering, Renewable Energy Engineering, Mathematics, Humanities and Social Sciences, and Communication Studies.

## Objectives

The objectives of the Environmental Sciences Program are:

1. To provide students with knowledge and training in the practical application of scientific reasoning and methodology to problems in environmental science and natural resource management.
2. To present complex environmental problems from a systems perspective that demands rigorous data acquisition and analytical techniques.
3. To provide exercises that support critical thinking and problem-solving skills, encourage student collaboration, and employ multiple methodological approaches.
4. To prepare students for professional careers and/or graduate studies by nurturing meaningful undergraduate research projects as a fundamental curricular element.

## Student Preparation

The Environmental Sciences curriculum is a demanding instructional program requiring the development and use of both qualitative and quantitative analytical perspectives and skills. Prospective students for this program are advised to complete two to three years of high school mathematics and science (biology, chemistry, and physics). Students should also be familiar with computer applications. Students transferring from other science or technical programs, including environmental programs at other institutions, are requested

to contact the program director for information on program requirements.

## Career Opportunities

Graduates can expect to find employment in, among other places, consulting firms, government agencies (regulatory and research), non-governmental organizations (NGOs), and education and research institutions. Students are also well prepared to enter graduate school. Environmental Sciences students at Oregon Tech have been actively recruited by the U.S. Geological Survey, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, Oregon State Police Wildlife Enforcement, Klamath County Health Department, Klamath Irrigation District, Klamath County Soil and Water Conservation District, the Nature Conservancy, and JELD-WEN Windows and Doors. Vocational placement of recent graduates has been excellent and many Environmental Sciences majors find part-time or summer employment directly related to their studies and career interests.

## Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and complete the courses listed in the curriculum to obtain a Bachelor of Science in Environmental Sciences. A total of 183 credits are required for the degree. Students are encouraged to develop a technical emphasis area based on their own interests. The sophomore project provides an opportunity for independent investigation early in the student's academic career. Students prepare the groundwork for their senior capstone project at the end of the junior year in BIO 473 - Senior Project Data Collection. The project culminates in BIO 474 Senior Project Data Analysis and Presentation – in fall of senior year.

Students are required to pass each science course with a grade of "C" or better. This requirement is based on the quantitative skills needed in later courses as well as the degree of integration in subject material that is present throughout the program.

## The Environmental Sciences Curriculum

The Environmental Sciences curriculum integrates “hands-on” skills and knowledge. Field or laboratory work are important components of many ES courses. Several freshman and sophomore courses allow a student to develop skills in computer applications, Geographic Information Systems (GIS), Global Positioning Systems (GPS), simulation modeling, streamwater chemistry and riparian assessment methods.

## Bachelor of Science in Environmental Sciences Curriculum

### Curriculum

Required courses and recommended terms during which they should be taken:

<b>Freshman Year</b>		<b>Fall</b>	<b>Junior Year</b>		<b>Fall</b>
BIO 111	Introduction to Environmental Sciences	4	BIO 471	Senior Project Proposal Research	1
BIO 211	Principles of Biology	4	CHE 331	Organic Chemistry I	4
GIS 103	The Digital Earth	2	MATH 361	Statistical Methods I	4
MATH 111	College Algebra	4	PHY 221	General Physics with Calculus **	4
WRI 121	English Composition	3	SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>17</b>	<b>Total</b>		<b>16</b>
<b>Freshman Year</b>		<b>Winter</b>	<b>Junior Year</b>		<b>Winter</b>
BIO 112	Introduction to Data Analysis or		BIO 434	Data Analysis Methods or	
MIS 102	Spreadsheet Software Laboratory	1	MATH 362	Statistical Methods II	4
BIO 212	Principles of Biology	4	BIO 472	Senior Project Proposal	1
GEOG 105	Physical Geography: Geomorphology or	3	ENV 314	Environmental Management and Restoration	3
GEOG 115	Physical Geography: Climatology	4	PHY 222	General Physics with Calculus ** Technical Emphasis elective *	4 3
GIS 105	Map and Compass/GPS	1	<b>Total</b>		<b>15</b>
MATH 112	Trigonometry Humanities elective	4 3			
<b>Total</b>		<b>16/17</b>	<b>Junior Year</b>		<b>Spring</b>
<b>Freshman Year</b>		<b>Spring</b>	BIO 327	General Ecology	4
BIO 213	Principles of Biology	4	BIO 473	Senior Project Data Collection	3
ECO 201	Principles of Economics, Microeconomics	3	PHY 223	General Physics with Calculus ** Technical Emphasis elective *	4 4
GME 134	Geographic Information Systems	3	<b>Total</b>		<b>15</b>
WRI 122	Argumentative Writing	3			
<b>Total</b>		<b>13</b>	<b>Senior Year</b>		<b>Fall</b>
<b>Sophomore Year</b>		<b>Fall</b>	BIO 474	Senior Project Data Analysis and Presentation	2
CHE 221	General Chemistry	5	BIO 484	Sustainable Human Ecology Humanities elective ****	4 3
ENV 225	Ecological Assessment of Riparian Ecosystems	2		Social Science elective	3
MATH 251	Differential Calculus	4		Technical Emphasis elective *	4
MIS 275	Introduction to Relational Databases <sup>2</sup>	3	<b>Total</b>		<b>16</b>
SPE 111	Public Speaking	3			
<b>Total</b>		<b>17</b>	<b>Senior Year</b>		<b>Winter</b>
<b>Sophomore Year</b>		<b>Winter</b>		Social Science elective	3
BIO 261	Sophomore Project Proposal	1		Social Science elective	3
CHE 222	General Chemistry	5		Technical Emphasis elective*	4
GIS 205	GIS Data Integration <sup>3</sup>	2		Technical Emphasis elective*	4
MATH 252	Integral Calculus	4	<b>Total</b>		<b>14</b>
WRI 227	Technical Report Writing	3			
<b>Total</b>		<b>15</b>	<b>Senior Year</b>		<b>Spring</b>
<b>Sophomore Year</b>		<b>Spring</b>		Humanities elective	3
BIO 262	Sophomore Project	4		Technical Emphasis elective *	3
CHE 223	General Chemistry	5		Technical Emphasis elective *	4
CHE 235	Streamwater Chemistry and Sampling	3		Technical Emphasis elective *	4
	Writing elective ***	3	<b>Total</b>		<b>14</b>
<b>Total</b>		<b>15</b>			

- \* May be 3 or 4 credits; a total of 31 credits of "technical emphasis" courses are required. At least one technical emphasis elective must be an upper-division chemistry course.
- \*\* Algebra-based PHY 201, PHY 202, and PHY 203 or calculus-based PHY 221, PHY 222, and PHY 223 are acceptable.
- \*\*\* Must take WRI 327, WRI 328, WRI 350 or WRI 410.
- \*\*\*\* PHIL 331 or 342 recommended.

**Total credits required for B.S. in Environmental Science: 183**

- 1 Sustainable Technologies Emphasis students substitute REE 201 Introduction to Renewable Energy.
- 2 Sustainable Technologies Emphasis students substitute CHE 260 Electrochemistry for Renewable Energy Applications.
- 3 Sustainable Technologies Emphasis students substitute MET 160 Materials I.

**Sustainable Technologies Emphasis:**

ANTH 335	The Built Environment	3
BUS 304	Engineering Management	3
BUS 416	Environmental Management	3
CHE 260	Electrochemistry for Renewable Energy Applications	4
CE 481	Environmental Engineering3	
CE 473	Groundwater	3
ENV	ENV elective	varies
MET 160	Materials I	3
MET 360	Materials II	3
REE 201	Introduction to Renewable Energy	3
REE 331	Fuel Cells	3
REE 344	Nuclear Energy	3
REE 346	Biofuels and Biomass	3

- \* ENV 207/307/407, ENV 265, ENV 365, ENV 435, advisor approved independent study, or an upper-division elective from another department with advisor approval. Different ENV 207/307/407 seminars may be taken multiple time for credit.

**Select 31 credits from one of the following areas of emphasis:**

**Watershed Science Emphasis:**

BIO 313	Botany	4
BIO 337	Aquatic Ecology	4
CHE 315	Environmental Chemistry and Toxicology	3
CHE 325	Soil Science	4
CHE 332	Organic Chemistry II	4
CHE 333	Organic Chemistry III	4
CHE 341	Instrumental Methods/Data Acquisition I	4
CHE 342	Instrumental Methods/Data Acquisition II	4
CHE 455	Water Quality Technology	3
CHE 465	Fate and Transport of Pollutants	4
CE 374	Hydrology	4
CE 473	Groundwater	3
ENV 325	Environmental Microbiology	4
ENV 336	Environmental Hydrology	4
ENV 466	Integrated Watershed Analysis	4
ENV 469	Treatment Wetlands	3
ENV	ENV elective *	varies
GME 161	Plane Surveying I	4

**GIS Emphasis:**

ENV	ENV elective *	varies
ENV	ENV elective *	varies
GIS 306	Geospatial Raster Analysis	4
GIS 316	Geospatial Vector Analysis I	4
GIS 332	Customizing the GIS Environment I	4
GIS 426	Geospatial Vector Analysis II	4
GIS 432	Customizing the GIS Environment II	4
GIS 446	GIS Database Development	4
GIS 456	GIS Management	3
MIS 115	Visual BASIC Programming	4

# Nursing – Oregon Statewide Integrated Nursing Program

Chris Tanner, R.N., PhD., F.A.A.N.,  
*Interim Dean*

Terry Ross, R.N., M.S., W.O.C.N., *Associate Dean*

*Associate Professor:* T. Ross

*Instructors:* M. Boham, B. Enos, M. Gran-Moravec, B. Hunter, C. Phelps, T. Rose, W. Zolczynski

This program is offered at Oregon Institute of Technology by the Oregon Health & Science University School of Nursing, in cooperation with Oregon Tech.

## Degrees Offered

Bachelor of Science with a major in Nursing

The OHSU School of Nursing is a health professions leader in academic productivity and innovative educational programming. It is recognized as a model in educating students for careers in nursing at both the graduate and undergraduate levels. In July 1993, the Nursing Program at Oregon Tech became a member of the Statewide Integrated Nursing Education System for Oregon. Campuses are located in: Ashland, at Southern Oregon University; Klamath Falls, at Oregon Institute of Technology; La Grande, at Eastern Oregon University; Monmouth, at Western Oregon University; and Portland, at Oregon Health & Science University. In addition to a basic baccalaureate degree in nursing, the statewide program offers opportunities for RNs seeking B.S. degrees.

Non-nursing coursework may be taken at Oregon Institute of Technology, a community college, or other accredited institutions of higher learning. Pre-nursing majors must apply and be accepted by the OHSU School of Nursing in order to progress into the nursing major. Admission is dependent on a point system which includes academic performance and a proctored essay.

The baccalaureate in Nursing Program provides the essential foundation for professional nursing licensure and practice. The Nursing Program, as of fall 2006, includes one year (if courses are begun in summer term, or having transfer credits) or two years of pre-nursing courses and then, after acceptance into the program, three years of professional nursing courses and general courses, as well. Selection

into the professional program is competitive.

Nursing courses build upon and complement the liberal arts and science foundation required for professional practice. The graduate of the B.S. program is eligible to complete the registered nursing licensure examination and is prepared to assume responsibility for providing professional nursing care.

## Options for Registered Nurses to Obtain a B.S.

There is a process in place for assisting RNs to complete coursework to obtain a B.S. This is an online degree and is not offered on the Oregon Tech campus. Please contact the School of Nursing for information at (866) 223-1811.

## Approval and Accreditation

The Nursing Program is approved by the Oregon State Board of Nursing (OSBN) and accredited by the Commission on Collegiate Nursing Education (CCNE) through 2013.

## Admission

To be considered for admission to the School of Nursing, a student must submit an online application and official transcripts ([www.ohsu.edu/son](http://www.ohsu.edu/son)).

The application process begins October 1 through February 15. The minimum criteria to apply are:

- have 30 credits completed by the end of fall term;
- have completed the Human Anatomy and Physiology I;
- be at the Intermediate Algebra math level;
- have a minimum 3.0 GPA for your prerequisite courses.

## Transfer Credits

Transfer credits are accepted subject to review by OHSU Registrar's office for comparability and number of credits which may be granted.

## Requirements for Major

Students with a baccalaureate degree in another discipline should see a nursing advisor for requirements with the nursing major.

## Bachelor of Science with a Major in Nursing Curriculum

Courses and terms during which they may be taken.

### Pre-Nursing

Freshman Year		Summer
SPE 111	Public Speaking†	3
WRI 121	English Composition	3
	Humanities elective	3
	Social Science elective	3
	Elective	3
<b>Total</b>		<b>15</b>

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry†	3
CHE 104	Elementary Chemistry Laboratory†	1
MATH 100	Intermediate Algebra*	
or		
MATH 243	Introductory Statistic **	4
PSY 201	Psychology	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
CHE 102	Elementary Chemistry•	3
CHE 105	Elementary Chemistry Laboratory•	1
PSY 311	Human Growth and Development I	3
WRI 122	Argumentative Writing	3
<b>Total</b>		<b>14</b>

Freshman Year		Spring
BIO 205	Nutrition•	3
BIO 233	Human Anatomy and Physiology III	4
CHE 103	Elementary Chemistry •	3
CHE 106	Elementary Chemistry Laboratory •	1
PSY 312	Human Growth and Development II	3
<b>Total</b>		<b>14</b>

\* The math competency may be demonstrated by a math placement test or by successful completion of MATH 95/100 Intermediate Algebra or higher.

\*\* Introductory Statistics is a nursing degree requirement.

• Chemistry/Lab is not a nursing prerequisite but it is a prerequisite to the nutrition course here on the Oregon Tech campus. It is highly recommended.

† SPE 111 is a prerequisite to the third writing (WRI 123 or WRI 227) course which is a degree requirement.

**Professional Courses****Sophomore Year** Fall

NRS 210A	Foundations of Nursing – Health Promotion	4
NRS 210B	Foundations: Practicum	5
WRI 123	Research Writing	
or		
WRI 227	Technical Report Writing	3
<b>Total</b>		<b>12</b>

**Sophomore Year** Winter

BIO 105	Microbiology	4
NRS 211	Foundations of Nursing in Chronic Illness I	6
NRS 230	Pharmacology I	3
NRS 232	Pathophysiology I	3
<b>Total</b>		<b>16</b>

**Sophomore Year** Spring

NRS 212	Foundations of Nursing in Acute Care I	6
NRS 231	Pharmacology II	3
NRS 233	Pathophysiology II	3
<b>Total</b>		<b>12</b>

**Junior Year** Fall

BIO 235	Human Genetics	3
NRS 322	Nursing in Acute Care II and End-of-Life	9
<b>Total</b>		<b>12</b>

**Junior Year** Winter

MATH 243	Introductory Statistics*	4
NRS 321	Nursing in Chronic Illness II and End-of-Life	9
<b>Total</b>		<b>13</b>

\* MATH 243 may be taken any term.

**Junior Year** Spring

NRS 410	Population-Based Chronic Illness and Health Promotion	9
NRS 411	Epidemiology	3
<b>Total</b>		<b>12</b>

**Senior Year** Fall

NRS 412	Leadership, Outcome Management in Nursing	10
	Elective	varies
<b>Total</b>		<b>10+</b>

**Senior Year** Winter

NRS 424	Integrative Practicum I	9
NRS 424	A-J Elective	1 varies
<b>Total</b>		<b>10+</b>

**Senior Year** Spring

NRS 425	Integrative Practicum II <sup>9</sup>	
NRS 425	A-J Elective	1 varies
<b>Total</b>		<b>10+</b>

# Respiratory Care and Polysomnography

James Hulse, *Department Chair and Program Director, Respiratory Care*

Jane Perri, *Program Director, Polysomnographic Technology*

David Panossian, *Medical Director*

Jeff Pardy, *Respiratory Care Clinical Education Director*

*Participating Faculty:* J. Beasley, P. Cabrera,

J. Dwan, K. Christensen, L. McLaughlin, K. Rabe, M. Schwartz, J. Shinn, A. Venes

## Polysomnographic Technology

### Degree Offered

Associate of Applied Science in Polysomnographic Technology

### Certificate Offered

Polysomnographic Technology

### Certificate in Polysomnographic Technology

Students must successfully complete the core courses required to sit for a national exam. Computer and Internet access is required. Successful completion of the certificate curriculum leads to eligibility to sit for the national Registered Polysomnographic Technologists examination (RPSGT).

### Associate of Applied Science in Polysomnographic Technology

Students must successfully complete the courses in the certificate program for Polysomnographic Technology and other primarily general education courses. The degree completion courses can be taken from Oregon Tech or transferred from another college. Successful completion of the two year curriculum leads to eligibility to sit for the national Registered Polysomnographic Technologists examination (RPSGT). Computer and Internet access is required.

Students who have completed the RPSGT exam may pursue a Bachelor of Science in Health Care Management, Clinical Option; Emphasis in Polysomnography. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the distance education program while working in their hometown. See the Management Department section of this catalog for more information regarding this degree.

### Accreditation

The Polysomnographic Technology Program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). The curriculum follows the guidelines suggested by the Association of Polysomnographic Technologists. Inquiries regarding accreditation should be directed to the Board of Registered Polysomnographic Technologists, 8201 Greensboro Drive, Suite 300, MacLean, VA 22102, (703) 610-9020. CAAHEP is a specialized accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S., Department of Education.

### Career Opportunities

Registered Polysomnographic technologists, under medical direction, conduct diagnostic testing and evaluation of sleep disorder patients. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, out-patient testing facilities and bio-medical equipment manufacturers. Currently there is a severe nationwide shortage of registered Polysomnographic technologists.

### Licensure

Students are eligible to sit for the national exam administered by the Board of Registered Polysomnographic Technologists following the completion of the core courses in the certificate program.

### Student Preparation

A science background is beneficial to those entering any health sciences profession. It is recommended that the student considering a career in Polysomnography take a college bound course of study in high school that includes algebra, chemistry and biology or human anatomy and physiology. It is recommended that students take courses in

Microsoft Word, Excel and PowerPoint in high school. Students are required to provide proof of completion either Cardio Pulmonary Resuscitation (CPR) or Basic Cardiac Life Support (BCLS) prior to admission.

### Computer Proficiency Requirement

Demonstrated computer proficiency is required by the Board of Registered Polysomnographic Technologists to be eligible to sit for the national exam. The PSG Program is a distance education program requiring basic computer proficiency to be successful. Successful completion of the program therefore, indicates basic computer proficiency.

### Degree Completion Program

The associate degree program offers a degree completion program for registered Polysomnographic technologists who lack a degree. The courses for this program can be taken through the Distance Education Department or in the classroom. Not all of the required courses are available online and must be taken either in the Oregon Tech classroom or a local college and transferred. The writing courses are offered through the distance education program of other colleges in the Oregon University System.

Upon receipt of the necessary documentation, specific college credits will be awarded to qualified applicants for having passed the Registered Polysomnographic Technologists examination.

### Admissions Procedures

All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:

1. All applicants are required to submit

the *Distance Education Application for Admission* and the appropriate *Statement of Acknowledgment* for this program to the Distance Education Department, accompanied by a \$100 nonrefundable fee and official transcripts from each college or university attended. Acceptance to the Polysomnographic Technology Degree Program is contingent upon acceptance to Oregon Tech. Detailed information and forms can be found on the Oregon Tech Distance Education website.

- Applicants for the certificate program must be high school graduates. If a prospective candidate is not currently employed in a sleep facility, an appropriate site must be found and a clinical agreement between Oregon Tech and that facility must be established prior to admission.
- Candidates must provide proof of completion of either a Cardio Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.
- Candidates must submit immunization records prior to their clinical placement.
- Criminal background clearance is required prior to acceptance and some clinical sites may require drug screening.

### Graduation Requirements

Minimum graduation requirements for the A.A.S are the successful completion of 46 credit hours of general education courses and 47 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of "C" or better must be earned in all professional courses (PSG, ECHO, and RCP), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.

In order to prepare for the national registry exam, students are required to participate in a practical exam and a comprehensive written exam at the conclusion of the certificate program. Students are required to come either to the Oregon Tech campus in Klamath Falls, Oregon or to Dayton, Ohio for one day of residency. Passage of these exams is required to complete the certificate program. Associate degree students who have already obtained their national licensure are not required to complete this requirement.

## Polysomnographic Technology Certificate Curriculum

A certificate will be awarded to students completing 47 credit hours of course work in Polysomnography. This program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). Completion of the certificate will allow the graduate to sit for the national registry exam in Polysomnographic Technology.

### Required courses:

Course #	Title	Credits
BIO 200	Medical Terminology	2
ECHO 227	Basic ECG Recognition and Testing	3
PSG 211	Fundamentals of PSG and Patient Care	3
PSG 221	Physiology of Sleep	3
PSG 231	Sleep Disorders Pathology	4
PSG 246	Sleep Disorders in Women	3
PSG 264	Pediatric/Neonatal Polysomnography	4
PSG 271A	Clinical Polysomnographic Technology Part C	6
PSG 271B	Clinical Polysomnographic Technology Part C	6
PSG 271C	Clinical Polysomnographic Technology Part C	6
OR		
PSG 272	Clinical Polysomnographic Technology I	9
PSG 273	Clinical Polysomnographic Technology II	9
RCP 120	Interventions in Gas Exchange	4
PSG 291	Clinical Sleep Educator	3
<b>Total</b>		<b>47</b>

Demonstrated computer proficiency is required by the Board of RPGST. After completion of the Web-based program, the student will have demonstrated computer proficiency.

The two clinical Polysomnographic technology courses require placement in clinical sites. Students are responsible for selecting an accredited sleep disorder facility prior to admission into the program. Site agreements between Oregon Tech and the accredited facility must be in place for the student to begin these courses. On-site preceptors will work in conjunction with Oregon Tech faculty to ensure an excellent training experience.

## Associate of Applied Science in Polysomnographic Technology Curriculum

All courses in the Certificate Program and all courses listed below are required to earn the A.A.S. degree:

Course #	Title	Credits
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
MATH 243	Introductory Statistics	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Math/Science/Social Science elective	6
	Humanities elective	3
	Electives	6
<b>Total</b>		<b>46</b>

### Total Credit Hours for A.A.S. Degree in Polysomnography

Polysomnographic Technology Certificate Courses	47
Additional Courses	46
<b>Total Credit Hours</b>	<b>93</b>



# Respiratory Care Program

## Degree Offered

Bachelor of Science in Respiratory Care

The Bachelor of Science degree program prepares the respiratory care student for entry into the respiratory care profession and eligibility for the National Board for Respiratory Care (NBRC) certificate examination (CRT) and registry examinations (RRT). Upon successful completion of the program, the graduate holds the RRT credential and is eligible to apply for state licensure.

## Accreditation

The Respiratory Care Program is fully accredited by the Commission on Accreditation for Respiratory Care ([www.coarc.com](http://www.coarc.com)), 1248 Harwood Rd., Bedford, TX 76021, (817) 283-2835.

## Career Opportunities

Registered respiratory therapists are physician extenders who, under medical direction, administer cardiopulmonary care, evaluate and assess pulmonary patients, and administer medications and diagnostic tests when appropriate. Their duties involve the use of many of the latest advances in medical arts, sciences, and technology. Graduates are employed in hospitals, physician's offices, rehabilitation facilities, home-care agencies and health care promotion centers as caregivers, managers and educators.

## Licensure

Students, when applying for licensure, will be asked if they have ever been convicted of a criminal offense, or if they have a history of drug or alcohol abuse. Students with a concern in this area should immediately contact the Oregon Respiratory Therapist Licensing Board (ORTLB) prior to applying to this program.

## Program Objectives

Upon completion of the program, graduates will demonstrate:

1. Professional behavior consistent with employer expectations as advanced level respiratory therapists (affective domain).
2. The ability to comprehend, apply and evaluate clinical information relevant to their roles as advanced-level respiratory therapists (cognitive domain).
3. The technical proficiency in all the skills necessary to fulfill their roles as advanced level respiratory therapists (psychomotor domain).

## Expected Program Learning Outcomes

Students in the program will demonstrate:

- The ability to communicate effectively in oral, written and visual forms.
- Knowledge of the respiratory care code of ethics and ethical and professional conduct.
- The ability to function effectively as a member of the healthcare team.
- Knowledge and application of mechanical ventilation and therapeutics.
- Knowledge and application of cardiopulmonary pharmacology and pathophysiology.
- Management of respiratory care plans for adult, neonatal and pediatric patients.

## Pre-Respiratory Care Freshman Year

Enrollment is open to all students who meet the general entry requirements to Oregon Institute of Technology. Students will be listed as Pre-Respiratory Care students. Students will be selected into the professional curriculum based on cumulative grade-point average, non-smoking status, performance on an anatomy and physiology test and submission of a technical paper. Alternatively, students may be admitted based upon successful completion of a CoARC accredited associate degree program in respiratory care.

Students are strongly advised to complete all the general education courses in the freshman year curriculum before making application to the professional program.

Selections will be made at the end of the spring and summer terms of the Pre-Respiratory Care year. The number of students selected each year will be determined by the availability of clinical sites and other resources, which means that the number of qualified applicants may exceed the number of spaces available. When that is the case, students with the highest cumulative GPA are the first to be offered a position in the program.

## Degree Completion Program

The Respiratory Care Program offers a degree completion program for respiratory therapists who wish to pursue a bachelor's degree in their field. The Commission on Accreditation for Respiratory Care does not accredit degree completion programs. The program is offered externally, utilizing mail, e-mail, video, fax and Internet delivery, and requires collaborative learning. Admission is based on successful completion of a CoARC accredited associate degree in respiratory care. When students have completed RCP 442 and have submitted documentation of the Registered Respiratory Therapist credential college credit is granted. Students must participate in an orientation. Each prospective student's academic credits will be individually evaluated to determine acceptability of the non-professional coursework and the sequencing of the professional courses. Every student must meet the Oregon Tech general education requirements for graduation. The Respiratory Care Degree Program includes the presentation of a senior project.

## Graduation Requirements

All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled. A minimum of 187 credits must be completed and students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all professional courses (RCP), communication courses and science/mathematics courses to continue in the program. All curricular requirements must be met within five academic years once the student is admitted into the professional program as a sophomore. Students must successfully pass SAE examinations and take and pass the CRT and RRT examinations as a condition of BS degree completion.

## Bachelor of Science in Respiratory Care Curriculum

Required courses and terms during which they may be taken.

### Pre-Respiratory Care

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra	
or		
MATH 243	Introductory Statistics	4
WRI 121	English Composition	3
<b>Total</b>		<b>15</b>

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
WRI 122	Argumentative Writing	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>16</b>

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
SPE 111	Public Speaking	3
	Humanities elective	3
	Social Science elective	3
<b>Total</b>		<b>15</b>

Freshman Year		Summer
COM 205	Intercultural Communication	3
WRI 227	Technical Writing	3
	Humanities elective	3
	Social Science elective	3
	Math/Science/Social Science elective	1
<b>Total</b>		<b>13</b>

### Professional Courses

Sophomore Year		Fall
BIO 336	Essentials of Pathophysiology	3
CHE 360	Clinical Pharmacology for the Health Professions	3
RCP 100	Introduction to Respiratory Care	2
RCP 231	Pulmonary Physiology	4
<b>Total</b>		<b>12</b>

Sophomore Year		Winter
BIO 105	Microbiology	4
RCP 235	Arterial Blood Gases	3
RCP 236	Cardiopulmonary Dynamics	3
RCP 241	Respiratory Gas Therapeutics	4
<b>Total</b>		<b>14</b>

Sophomore Year		Spring
RCP 221	Introduction to Patient Assessment	3
RCP 223	Emergent Chest Radiographic Interpretation	2
RCP 252	Cardiopulmonary Pharmacology	4
RCP 336	Hyperinflation Therapies	3
SPE 321	Small Group and Team Communication	3
<b>Total</b>		<b>15</b>

Junior Year		Fall
RCP 337	Pulmonary Pathology	4
RCP 351	Mechanical Ventilation I	4
RCP 388	Advanced Neonatal Respiratory Care	4
<b>Total</b>		<b>12</b>

Junior Year		Winter
RCP 352	Mechanical Ventilation II	4
RCP 386	Critical Care I	4
RCP 389	International Neonatology	4
<b>Total</b>		<b>12</b>

Junior Year		Spring
RCP 326	Disaster Preparedness	1
RCP 335	Exercise Physiology and Education	2
RCP 345	Cardiopulmonary Diagnosis and Monitoring	3
RCP 353	Mechanical Ventilation III	4
RCP 387	Critical Care II	2
<b>Total</b>		<b>12</b>

Senior Year		Summer
RCP 350	Introduction to Clinical	9
RCP 366	Clinical Simulation	3
RCP 440	Case Management/Credentials I	3
<b>Total</b>		<b>15</b>

Senior Year		Fall
RCP 441	Case Management/Credentials II	3
RCP 450	Clinical Care I	9
<b>Total</b>		<b>12</b>

Senior Year		Winter
RCP 442	Case Management/Credentials III	3
RCP 451	Clinical Care II	9
<b>Total</b>		<b>12</b>

Senior Year		Spring
RCP 452	Clinical Care III	12
<b>Total</b>		<b>12</b>

Total credits required for B.S. in Respiratory Care:

187

## Bachelor's Degree Completion Respiratory Care

The Respiratory Care program offers a degree completion program for registered technologists in good standing, who wish to pursue a bachelor's degree in their field. The program is offered completely online. There is no on campus residency requirement.

### Admission Procedures

1. Complete the *Distance Education Application for Admission*.
2. Mail your application, a copy of your registry certificate, a check for \$100 (payable to Oregon Institute of Technology) and a signed Statement of Acknowledgement to the Distance Education Office.
3. Request official transcripts from all colleges you have attended to the Distance Education Office.
4. If you are a Registered Respiratory Therapist, request a letter of good standing from NBRC be mailed to the Oregon Tech Distance Education Office. This letter will enable the University Registrar to grant college credit based on your registry.

### Courses granted for Registered Respiratory Therapist (RRT)

RCP 100	Introduction to Respiratory Care (waived)	0
RCP 221	Introduction to Patient Assessment	3
RCP 223	Emergent Chest Radiographic Interpretation	2
RCP 231	Pulmonary Physiology	4
RCP 235	Arterial Blood Gases	3
RCP 236	Cardiopulmonary Dynamics	3
RCP 241	Respiratory Gas Therapeutics	4
RCP 252	Cardiopulmonary Pharmacology	4
RCP 336	Hyperinflation Therapies	3
RCP 337	Pulmonary Pathology	4
RCP 350	Introduction to Clinical	9
RCP 351	Mechanical Ventilation I	4
RCP 352	Mechanical Ventilation II	4
RCP 386	Critical Care I	4
RCP 450	Clinical Care I	9
RCP 451	Clinical Care II	9
RCP 452	Clinical Care III	12

## Oregon Tech Degree Completion Courses

BIO 336	Essentials of Pathophysiology	3
CHE 360	Clinical Pharmacology for the Health Professions	3
COM 205	Intercultural Communication	3
RCP 326	Disaster Preparedness	1
RCP 335	Exercise Physiology and Education	2
RCP 345	Cardiopulmonary Diagnosis and Monitoring	3
RCP 353	Mechanical Ventilation III	4
RCP 366	Clinical Simulation	3
RCP 387	Critical Care II	2
RCP 388	Advanced Neonatal Respiratory Care	4
RCP 389	International Neonatology	4
RCP 440	Case Management/Credentials I	3
RCP 441	Case Management/Credentials II	3
RCP 442	Case Management/Credentials III	3
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing	3
	Humanities elective	6
	Social Science elective	6

## Prerequisite/Transfer Courses

BIO 105	Microbiology	4
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Elementary Chemistry	3
CHE 104	Elementary Chemistry Laboratory	1
MATH 111	College Algebra or	
MATH 243	Introductory Statistics	4
PSY	Psychology 201, 202, or 203	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
	Humanities elective	3
	Social Science elective	3
	Elective	2

# Selected Courses in Physical Education and Health Education

## Physical Education Philosophy and Courses

At Oregon Institute of Technology, the physical education philosophy is that every man and woman can achieve and maintain fitness through a sound program based on varied developmental, sport, and recreational activities. The physical education courses provide basic instruction in vigorous activities.

Course offerings include fitness training, weight lifting, aerobics activities, archery, ice skating, rugby, recreational basketball, tai chi, zumba, yoga, kick boxing, core strength & balance, pilates, rowing, belly dance, scuba, relaxation & flexibility, varsity sports and major sports seminars, including weight loss and weight loss management. Other offerings include wilderness navigation, cross country skiing and snowshoeing.

## Health Education Philosophy and Courses

Selected courses in health education are provided to assist students to prevent physical and mental health disorders and to promote well-being.

## Course Policy

Physical education courses are currently offered as elective credits only. Some courses may require an additional course fee depending on facility and special equipment needs. There is no limit on the number of times a physical education course can be repeated.

# Graduate Programs

## Admissions and Academic Policies

Graduate degree programs at Oregon Institute of Technology provide students with opportunities for advanced study in various disciplines. Graduates will develop the competence required for leadership roles in business and industry. Graduate education at Oregon Tech maintains a hands-on focus. Our mission is to integrate theory and practice.

### Admission

The Office of Admissions, in conjunction with the Provost's Office and the appropriate academic department, maintains all pertinent information regarding the admission of graduate students.

### Admission Requirements

To be considered for admission to a graduate program, an applicant must have a baccalaureate degree from a regionally accredited college or university, as well as a scholastic record that evidences the ability to perform satisfactory graduate work. Specifically, a student shall:

- Have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association.
- Be in good academic standing at the last college or university attended.
- Have attained a grade point average of at least 3.0 on a 4.0 scale for the last 90 term (60 semester) units attempted.
- Have attained a grade point average of at least 3.0 on a 4.0 scale for the last 45 term hours in the major.
- Satisfactorily meet the professional, personal, scholastic, and other standards for graduate study.
- Some programs may require qualifying examinations.

Unusual circumstances may warrant exceptions to these criteria.

### Application as a Degree-Seeking U.S. Resident Student

Degree-seeking students must submit the following items to the Office of Admissions before the deadlines specified in the Application Deadlines section:

- An official admissions application, along with a \$50 non-refundable application fee. The application fee is waived for applicants who are currently attending Oregon Tech or who graduated from Oregon Tech within the previous two years.
- Official transcripts from each postsecondary educational institution attended.

Individual programs may have additional requirements. Applicants must submit all required items before admission to the graduate program will be considered. Submitting the items, however, does not ensure admission. Applicants will receive official notification of admission after a review of the application by the Office of Admissions and the graduate program department.

### Application as an International Degree-Seeking Graduate Student

Oregon Tech must assess the academic preparation of international students. For this purpose, international students, including those who hold U.S. visas as student exchange visitors or other non-immigrant classifications, should apply early. Official transcripts must be on file at least eight weeks before registration for the first term and, if not written in English, must be accompanied by a certified English translation.

All international applicants from countries in which English is not the native language must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 68 internet-based TOEFL or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English. Since the

results of this test constitute part of the material reviewed for admission to graduate studies at Oregon Tech, students should arrange to have their test scores sent directly from the testing agency to the Office of Admissions well before the application deadline.

The following is an application checklist for degree-seeking international students:

1. Submit the graduate application for admission with the \$50 (U.S.) application fee.
2. Submit the international graduate student supplement to the graduate application form (as well as the Statement of Financial Responsibility form), available from the Admissions Office.
3. Provide evidence of ability to meet educational expenses at Oregon Tech. The Statement of Financial Responsibility form must be completed and submitted with documentation such as official bank statements and tax returns.
4. Official academic transcripts of all university course work sent to Oregon Tech.
5. For university course work done outside the United States, transcripts must be reviewed by an evaluation service. There are several such services that are acceptable. A "course-by-course evaluation" or a "detail report" is necessary.
6. Proof of proficiency in the English language. Oregon Tech requires that international graduate students Official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 68 Internet-based TOEFL, or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English.
7. Students currently in the United States should submit a photocopy of the I-20 form and passport.

Individual programs may have additional requirements.

## Application Deadlines

Oregon Tech encourages all prospective students to submit graduate application materials six to nine months in advance of the planned enrollment date. However, applications will be accepted any time before the deadlines listed below. The recommended entrance time is fall term.

- Fall Term: July 1
- Winter Term: October 1
- Spring Term: January 1

## Social Security Number Disclosure and Consent Statement

U.S. nationals are requested to voluntarily provide your Social Security Number to assist OUS (and organizations conducting studies for or on behalf of OUS) in developing, validating, or administering predictive tests and assessments; administering student aid programs; improving instruction; internal identification of students; collection of student debts; or comparing student educational experiences with subsequent work force experiences. When conducting studies, OUS will disclose your Social Security Number only in a manner that does not permit personal identification of you by individuals other than representatives of OUS (or the organization conducting the study for OUS) and only if the information is destroyed when no longer needed for the purposes for which the study was conducted. By providing your Social Security Number, you are consenting to the uses identified above. This request is made pursuant to ORS 351.070 and 351.085. Provision of your Social Security Number and consent to its use is not required and, if you choose not to do so, you will not be denied any right, benefit, or privilege provided by law. You may revoke your consent for the use of your Social Security Number at any time by writing to: University Registrar, Oregon Institute of Technology, 3201 Campus Drive, Klamath Falls, OR 97601.

## Residency Classification

See the residency section of this catalog.

## Tuition and Fees

See the tuition and fees section of this catalog.

## Graduate Assistantships

Oregon Institute of Technology offers graduate assistantships, awarded on a competitive

basis, to qualified graduate students based on department needs. Compensation varies with the type of service, the amount of time required for performing the service, and the academic qualifications and experience of the appointee.

An applicant for a graduate assistantship must be admitted to a graduate program. Graduate departments usually award appointments and assistantships by early summer, effective at the beginning of the next academic year. A graduate assistant application form is available from the appropriate department.

## Types of Assistantships

Graduate assistantships at Oregon Tech are either research assistantships (RAs) or teaching assistantships (TAs). Research assistantships are awarded by the faculty member administering the research grant and involve providing assistance in fulfilling the goals and objectives of the grant. Depending upon the grant, research assistantships may include additional support for summer term. If you are interested in a research assistantship, contact the faculty members responsible for the grant.

Teaching assistantships are awarded by the department and involve classroom and laboratory instruction. TAs are only awarded for nine-month periods during the academic year. If you are interested in a TA, contact the individual department to determine availability.

## Assistantship Offer

Assistantship contracts are awarded annually and renewal is dependent upon competent performance of assistantship duties, adequate academic progress and the availability of funds. Assistantship appointments are for two academic years; however, under special circumstances, appointments may continue for a third and final year.

Assistantships may include a tuition waiver as well as a monthly stipend based upon a percentage of a full-time equivalent (FTE) salary. Graduate student stipends are not subject to Social Security (FICA) taxes but are subject to income taxes and should be reported on your tax return.

## Assistantship Course Load

Graduate assistants are expected to maintain full-time enrollment (nine credits). Graduate assistants not enrolled in nine credits of

formal courses must supplement the course load with thesis or project credits to maintain full-time enrollment status.

## Satisfactory Progress

Graduate assistants must make satisfactory progress toward a graduate degree to retain a graduate assistantship. Satisfactory progress includes:

- Maintaining a 3.0 or higher grade point average.
- Maintaining full-time student enrollment.

Failure to maintain satisfactory academic progress will result in loss of an assistantship.

## Academic Policies

The Graduate Council determines graduate academic policies at Oregon Tech. Other academic policies and procedures are described and/or defined in the general policies of Oregon Tech.

## Student Rights and Responsibilities

Oregon Tech encourages students to perform at a high academic level, and students are responsible for knowing degree requirements and enrolling in courses that will enable them to complete the master's program. Oregon Tech expects students to conduct themselves in a manner compatible with the university's function as an institution of higher learning. Students should acquaint themselves with regulations for the standard of work required to continue in the graduate school. For additional information, students should consult their graduate advisor.

## Academic Integrity

Oregon Tech's goal is to foster an atmosphere that produces educated, literate graduates. Academic misconduct, such as cheating and plagiarism, will not be tolerated. Cheating includes, but is not limited to, the following:

- Use of any unauthorized assistance in taking quizzes, tests or examinations.
- Dependence upon the aid of sources specifically prohibited by instructors in writing papers, preparing reports, solving problems or carrying out other assignments.
- The acquisition, without permission, of tests or other academic materials belonging to a faculty member of the school.

Plagiarism includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without acknowledging the source. Plagiarism occurs when a student either copies the work of another person and attempts to receive credit for that work or acquires and uses prepared material from someone who is selling academic materials. These examples are intended to provide general guidelines and are in no way comprehensive in describing academic dishonesty.

Faculty may assign specific penalties for cases of academic misconduct, including a failing grade for a test or assignment, a reduced grade for a test or assignment, or a failing grade in the course. Responding to academic dishonesty is the responsibility of the course instructor. If a student commits plagiarism or other academic dishonesty during the graduate project, the advisor, in consultation with the dean, determines the appropriate response.

All graduate students should acquaint themselves with the definitions and implications of academic misconduct as explained in Oregon Tech's student conduct code. Repercussions for a student guilty of academic conduct violations range from a warning to expulsion. Students may contest a charge of academic misconduct by following the grievance procedure outlined in the Oregon Tech catalog and the student handbook, available on the Oregon Tech Web site.

## Student Records

The Registrar's Office maintains a permanent file for each graduate student. Faculty advisors will maintain a file of advising records, grade information and other correspondence pertaining to each graduate student's academic progress. For more information on student records, contact the Registrar's Office.

## Enrollment Status

Full and part time credit loads for graduate students are defined as follows:

- Full time: 9 or more credits
- 3/4 time: 7 - 8 credits
- Half time: 5 - 6 credits

Oregon Tech undergraduate seniors may enroll in 500-level graduate courses for graduate credit with the approval of the student's undergraduate advisor and the graduate program director. Nine credits are applicable to a graduate degree.

Students who are not yet admitted to Oregon Tech may take up to nine credits which can apply toward the graduate degree. These courses cannot count for both undergraduate and graduate credits.

Oregon Tech offers some courses which are dual-listed at the 400- and 500-level. The 400-level courses apply only to an undergraduate degree, while 500-level courses apply only to a graduate degree. Students enrolled in a dual-listed 500-level course will be required to complete additional work to obtain graduate credit.

## Academic Prerequisite Deficiencies

Students who have prerequisite deficiencies for graduate studies may be required to take additional course work prior to completing their graduate studies, as determined by the graduate program director. If there are deficiencies, the director will recommend substitute courses, and these are entered on the Graduate Program Form. When students pass these courses with a B or better, they become fully qualified graduate students. Prior to completion of the listed courses, the graduate student is considered "conditionally admitted."

## Academic Performance Standards

Students must maintain a cumulative GPA of 3.0 or better in all graduate work specific to the program of study to remain in good academic standing. Grades below C do not meet requirements for a graduate degree.

Graduate students earning a cumulative GPA of less than 3.0 will be placed on probation and, if no improvement is made, will be suspended from the graduate program. Conditions established for probation and suspension are listed below:

**Academic Probation:** Students having 9 or more attempted credit hours will be placed on academic probation for each term that their cumulative GPA falls below 3.0.

**Academic Suspension:** Students who have served one term on academic probation and have not raised their graduate cumulative GPA to 3.0 in the next term will be placed on academic suspension. Suspended students lose their institutional financial aid, including graduate research and teaching assistantships.

A student may appeal academic suspension by following the process outlined in the Oregon Tech catalog. A successful appeal results in probation status.

## Transfer Credits

Students may petition to transfer up to 12 graduate term hours earned at other accredited institutions and apply those credits toward an Oregon Tech graduate degree. However, each course must be consistent with the program of study planned by the student and the graduate advisor. Only grades of A and B are acceptable as transfer credit into the graduate program.

## Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student's performance will be graded by the instructor and reported to the Registrar's Office.

## Withdrawals

Students may withdraw from a course during the first 10 days of class with no entry on the permanent academic record, except for complete withdrawal from all classes. After this date and through Friday of the seventh week, students who withdraw from a class will receive a W, which is not included in the grade point average. After Friday of the seventh week, students will receive a letter grade assigned by the instructor.

A complete withdrawal from all courses is possible at any time during the term until the last day of class by filing the proper forms with the Registrar's Office. Specific deadlines are published in the quarterly class schedule.

While it is the student's responsibility to properly withdraw from a class, an instructor may administratively withdraw a student for non-attendance.

## Academic Requirements

Graduate degree academic requirements are specified by the program. The student, in conference with the graduate faculty advisor, will prepare a program of study for the graduate degree as a guide for planning an academic schedule. The student must then submit the proposed program to the graduate program director for approval.

### **Application for Graduation**

To apply for graduation, the student must submit a petition for graduation to the Registrar's Office two terms in advance of the anticipated final term of work. The petition is a record of the approved program of study. To receive favorable action, candidates must meet the following requirements:

- Show that course requirements for the master's degree will be satisfied before or during the final term
- Maintain an overall grade point average of at least 3.0
- Provide evidence of passing any qualifying or comprehensive examinations, including defense of the master's project or thesis

### **Right of Appeal**

Students have the right to appeal academic policies or requirements. Grade appeals should be initiated through the instructor, graduate program coordinator, and the dean. For appeals regarding specific degree requirements, students should consult their graduate advisor, the graduate program coordinator, and the Graduate Council. Students should submit all other academic policy appeals in writing to the Graduate Council through the Provost's Office.

# Course Descriptions

Course descriptions in this section are reasonable summaries only and are neither completely inclusive nor completely exclusive of total course content for any given course.

Courses listed herein may or may not be offered each term.

Courses are listed alphabetically according to prefix.

## Numbering Code

Courses are grouped into a three-digit number series which indicates the normal teaching levels. Some variations may occur.

**1-99** Preparatory and Developmental Courses. Courses numbered below 100 are not applicable toward a degree even though units are assigned, grades are awarded and tuition is assessed.

Lower-Division Courses (freshman and sophomore)

**100-199** First-Year Courses

**200-299** Second-Year Courses

Upper-Division Courses (junior and senior)

**300-399** Third-Year Courses

**400-499** Fourth-Year Courses

Graduate Courses

**500-599** Graduate Courses

## Other Codes

*Each Term:*

Some courses in this section have a code following the course title. This code designates when the course will be offered. F indicates fall, W indicates winter, S indicates spring.

*Lecture, Lab, Credit Hours:*

The three numbers following the course title. For example:

CST 101 Introduction to Personal Computing

(3-3-4) = weekly lecture hours – lab hours – total credits



## Special Terms

**As Required:** This term designates a course or series of courses which will be offered only as enrollment, student interest, or individual department needs demand and as staffing allows. A course so designated may be offered if special student needs, situations of extreme hardship, or other unusual circumstances deem it in the best interest of both the student(s) and the institution to do so.

**Hours to be Arranged Each Term:** Normally students negotiate individually with faculty members and/or departments and arrange to have courses offered for the term most suitable to their unique situation.

**Corequisite:** A course that must be taken simultaneously with another course. Corequisites are noted at the end of each course description.

**Prerequisite:** A course that must be passed satisfactorily before another course may be taken. Prerequisites are noted at the end of each course description.

**Quarter Credit:** A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately 15 weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

A numerical credit value assigned to certain number of lecture or laboratory hours. A lecture class meeting for three 50-minute periods a week would be assigned three units

of credit. Students have traditionally been expected to spend an additional six hours of outside class work per week for each three units of lecture class credit. Generally, a lab class requires three hours per week for one unit of credit, or a total of 9 in-lab hours with no additional outside class work expected for three units of lab class credit.

**Reading and Conference:** A course taken on an independent study basis with the supervision of an instructor, usually consisting of weekly conferences, assigned readings, research papers, etc.

**Seminar:** A class taught by a group discussion process rather than by means of formal lecture. Student research and reporting are usually expected.

**Sequence:** A series of classes in the same subject area that, taken as a whole, comprise a full year's work. Generally, course sequences are numbered consecutively, and often (though not always) should be taken in the numerical order listed (i.e., CHE 201 should be taken before CHE 202, etc.).

## (ACAD) Academic Success

### ACAD 101 Student Success Seminar (Variable Credit)

A course to facilitate the success of first year students at Oregon Tech. Emphasis on faculty-student and student-student interactions. Includes academic resources, campus services, the learning process, communication skills, health and wellness issues. May also include academic skills and career planning.

### ACAD 105 Achieving Academic Success (2-0-2)

Course identifies attitudes, behaviors and specific strategies that will lead to academic success at the college level. Topics may include study habits, time management, strategies for memorization and test-taking and goal-setting.

### ACAD 107, ACAD 207, ACAD 307, ACAD 407 Seminar (Hours to be arranged each term.)

### ACAD 115 Career Exploration (3-0-3)

Effective academic and career decision-making is facilitated by thorough self-assessment, exploration of the world of work and identification of appropriate academic majors. Course includes activities such as personality type testing, research, visits to academic departments and information interviews with professionals in various occupations.

### ACAD 120 Stress Management (2-0-2)

Identifies signs and symptoms of stress as well as the ways in which they impact student academic success. Effective ways of dealing with stress, including relaxation techniques, will be identified, discussed and practiced.

### ACAD 135 Reading Tutor (2-0-2)

For "America Reads" tutors. Provides information about how children learn to read and write, strategies for teaching children and working in an elementary school.

## (ACC) Accounting

### ACC 101 Introduction to Accounting

(3-0-3)

The principles of elementary accounting systems for small businesses.

### ACC 107, ACC 207, ACC 307, ACC 407 Seminar

(Hours to be arranged each term.)

### ACC 115 Basic Income Tax Preparation

(2-4-3)

Federal and state laws, ethics and regulations applicable to individual income tax returns. Prepares tax preparers for the qualifying examination and meets the personal needs of individuals preparing their own returns.

### ACC 124 Business Math/Machines

(3-0-3)

Business math such as decimals, percents, markups, proration and interest. Emphasis on operational techniques of electronic calculators for problem solving.

### ACC 201 Principles of Accounting I

(4-0-4)

Introduction to terminology, content and form of financial statements for sole proprietorships. Recording of data for use in preparing profit and loss statements and balance sheets.

Prerequisite: MATH 100 or equivalent.

### ACC 202 Principles of Accounting II

(4-0-4)

A continuation of ACC 201 with emphasis on corporate accounting.

Prerequisite: ACC 201 with grade "C" or better.

### ACC 203 Principles of Managerial Accounting

(4-0-4)

Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Technique of standard costs, analysis of variance, managerial reports and specialized cost programs including activity based costing systems.

Prerequisite: ACC 201 with grade "C" or better.

### ACC 205 Computerized Accounting

(2-3-3)

Spreadsheet software used to solve account-

ing problems, model-building techniques. Integrated accounting software introduced. Prerequisite: ACC 201.

### ACC 245 Payroll Accounting

(3-0-3)

Covers federal and state laws pertaining to wages, payroll taxes, payroll tax forms and journal and general ledger transactions. Emphasis is placed on computing wages; calculating social security, income and unemployment taxes; preparing appropriate payroll tax forms; and journalizing/ posting transactions.

Prerequisite: ACC 101 or ACC 201.

### ACC 295 Individual Studies

(Hours to be arranged each term.)

### ACC 298 Reading and Conference

(Hours to be arranged each term.)

### ACC 299 Laboratory Practice

(Hours to be arranged each term.)

### ACC 320 Cost Accounting I

(4-0-4)

Cost accumulation systems including job order costing, process costing and activity-based costing will be explored. Techniques to control and evaluate operations including variance analysis based on flexible budgets and standard costs.

Prerequisite: ACC 203 with grade "C" or better.

### ACC 321 Cost Accounting II

(4-0-4)

Continuation of Cost Accounting I. Strategic planning and financial budgeting. Cost measurement, planning, control and performance evaluation and behavioral issues. The role of responsibility accounting for revenue, cost, contribution and profit centers will be investigated.

Prerequisite: ACC 320 with grade "C" or better.

### ACC 325 Finance

(4-0-4)

Emphasis on working capital management, long-term finance and capital structure. Prerequisites: ACC 203, and MATH 105 or MATH 111.

### ACC 331 Intermediate Accounting I

(4-0-4)

Financial accounting concepts, theory and practices involving current asset accounts;

practical application of theory to accounting problems.

Prerequisite: ACC 202 with grade "C" or better.

### ACC 332 Intermediate Accounting II

(4-0-4)

Accounting concepts, theory and practices involving ownership equities, interpretation, analysis of financial statements and correction of errors; practical application of theory to accounting problems.

Prerequisite: ACC 331 with grade "C" or better.

### ACC 333 Intermediate Accounting III

(4-0-4)

Accounting concepts, theory and practices involving plant assets, intangible assets and liabilities; practical application of theory to accounting problems.

Prerequisite: ACC 332 with grade "C" or better.

### ACC 405 Accounting Information Systems

(4-0-4)

Analysis of accounting cycles and the associated controls with emphasis on problem solving and critical thinking. Includes computerized accounting system implementation.

Prerequisites: ACC 332, MIS 275, MIS 312.

### ACC 411 Income Tax Procedures

(4-0-4)

Federal and state income tax laws and regulations applicable to individuals and their businesses including computerized tax return preparation.

Prerequisite: ACC 333 with grade "C" or better.

### ACC 412 Corporate Taxation

(4-0-4)

Federal tax law applicable to corporations, partnerships and estates. Emphasis on tax research procedures and locating and evaluating various sources of tax law.

Prerequisite: ACC 411 with grade "C" or better.

### ACC 421 Income Tax Procedures Laboratory

(0-6-2)

Lab accompanying class content in ACC 411.

**ACC 431 Advanced Accounting I**

(4-0-4)

Comprehensive study of problems in partnership accounting, fund accounting, branch accounting and governmental accounting. Prerequisite: ACC 333 with grade "C" or better.

**ACC 432 Advanced Accounting II**

(4-0-4)

Analysis of problems facing small, medium and large companies, with emphasis upon an integrated and concurrent decision making methodology applying economics, finance, organizational theory, quantitative analysis and accounting and tax theory. Prerequisite: ACC 431 with grade "C" or better.

**ACC 435 Auditing**

(4-0-4)

Introduction to auditing concepts and practices. Topics include professional standards, audit planning and procedures, ethical considerations, internal controls, professional responsibilities, the acquisition and evaluation of audit evidence and report writing. Prerequisites: ACC 333, ACC 405, both with grade "C" or better.

**ACC 465 Case Studies in Accounting**

(4-0-4)

The use of accounting cases to develop problem solving/critical thinking skills. Application of the case methodology to all areas of accounting.

Prerequisites: ACC 431, ACC 435, ACC 496, all with grade "C" or better.

**ACC 496, ACC 497 Senior Project**

(3-0-3)

Development and implementation of an accounting related project for the benefit of an external entity and the student. Projects will include a proposal, analysis, design and implementation. An oral presentation and project documentation will be required at the completion of each course.

Prerequisites: ACC 320 and ACC 405, or instructor consent.

**(AHED) Allied Health Education****AHED 107, AHED 207, AHED 307, AHED 407 Seminar**

(Hours to be arranged each term.)

**AHED 450 Instructional Methods**

(3-0-3)

Students develop instructional content and an instructional plan for teaching topics for adult learners. Teaching methods, learning styles, student and instructor evaluation and use of media will be discussed.

Prerequisite: DH 380 or admission to RCP or BDH degree completion program.

**AHED 451 Instructional Experience**

(2-3-3)

Students create and structure their own instructional experience, participate in a clinical or laboratory setting as a supervising instructor, present a didactic unit using visual aids.

Prerequisite: AHED 450.

**AHED 452 Instructional Practicum**

(0-9-3)

Student and faculty advisor design an individualized teaching experience. A learning contract is written and implemented.

Prerequisite: AHED 451 or AHED 460.

**AHED 460 Fundamentals of Distance Education**

(3-0-3)

Students learn the fundamentals of online teaching and learning. Lesson plan developed in AHED 450 will be finalized as an online module. Synchronous vs. asynchronous learning, instructional design and course management as it relates to online instruction will be discussed.

Prerequisite: AHED 450.

**(ANTH) Anthropology****ANTH 101 Introduction to Physical Anthropology**

(3-0-3) SS

An introduction to physical anthropology, emphasizing man's place in the animal kingdom, evolution of man, fossil hominid forms, Paleolithic cultures and principles of genetics. Satisfies either a science elective or a social science elective.

**ANTH 102 Introduction to Archeology**

(3-0-3) SS

Survey of the science of archeology. Covers the biological and social evolution of the human species with emphasis on the growth of human populations and social complexity. Relates site-specific evidence to theories of social change. Discusses field and laboratory methods of archaeology.

**ANTH 103 Introduction to Cultural Anthropology**

(3-0-3) SS

Culture, language, subsistence patterns, group formation, kinship, economic systems, political organizations, religion and cultural change.

**ANTH 107, ANTH 207, ANTH 307, ANTH 407 Seminar**

(Hours to be arranged each term.) SS

**ANTH 335 The Built Environment**

(3-0-3) SS

An examination of the American built environment from historical to modern times and the role it plays in shaping American Society. The topics include city planning, architecture, transportation technologies, dam and bridge building and urban sprawl.

**ANTH 452 Globalization**

(3-0-3) SS

Addresses what globalization is and how it developed and spread. Benefits and harms of globalization in the areas of work, culture, warfare, national sovereignty, health and food. Countervailing pressures from social movements will be examined.

Prerequisite: WRI 122.

**(ART) Art****ART 107, ART 207, ART 307, ART 407 Seminar**(Hours to be arranged each term.) *H or HP***ART 210 Beginning Sculpture**(1-6-3) *HP*

Introductory studio course in beginning sculpture, emphasizing basic materials and techniques.

**ART 220 Basic Drawing**(0-6-3) *HP*

Designed for the student who has an interest in exploring the field of pictorial representation but has had, for a variety of reasons, little opportunity to do so.

**ART 226 Digital Photography**(3-0-3) *HP*

Studio course in digital photography, studying and producing photographs. Focus on digital exposures, color, location, Photoshop techniques and issues in photography. Students must have the use of a digital SLR camera or a digital camera with a manual setting.

**ART 280 Introductory Painting**(0-6-3) *HP*

Offers an opportunity to study rendering in color by exposure to a study of color and color mixing, tones and values with an introduction to acrylics, watercolors and oils.

**ART 282 Introduction to Acrylic Painting**(1-6-3) *HP*

Introductory studio course with emphasis on basic materials and techniques in acrylic painting.

**(BIO) Biology****BIO 101 General Biology**

(3-3-4)

Introduction to cell biology, genetics and evolution.

**BIO 102 General Biology**

(3-3-4)

Consideration of phylogenetic relationships of the major groups of plants and animals.

**BIO 103 General Biology**

(3-3-4)

Basic animal physiology with emphasis on humans. (Cannot be used for graduation credit by students who have taken BIO 231, BIO 232 or BIO 233.)

**BIO 105 Microbiology**

(3-3-4)

Classification, morphology, reproduction, transmission and control of micro-organisms causing disease in man. Laboratory practice in culturing methods, microscopic observation and physical and chemical control.

**BIO 107, BIO 207, BIO 307, BIO 407 Seminar**

(Hours to be arranged each term.)

**BIO 109 Introduction to the Medical Sciences**

(1-2-2)

Survey of medical and health-related occupations, including biomedical sciences. Discussion of health care structure, private and public entities, the research community and trends in health education and practice.

**BIO 111 Introduction to Environmental Sciences**

(3-3-4)

A topical overview of environmental sciences

stressing the integration of the social, natural and physical sciences. Emphasis on active learning.

**BIO 112 Introduction to Data Analysis**

(1-0-1)

Skills in sampling design, analysis and quality control measures essential in acquiring defensible environmental data. Use of time series analysis, spreadsheets for data analysis and graphical display including trend lines, histograms and cumulative frequency distributions. Basic computer proficiency is expected.

**BIO 135 Preparation for Human Anatomy and Physiology**

(1-0-1)

Study techniques for a science course are explored using examples from Human Anatomy and Physiology.

Corequisite: BIO 231

**BIO 200 Medical Terminology**

(2-0-2)

Basic structure of medical works including prefixes, suffixes, roots and combining forms. Correct spelling, pronunciation and meaning of terms are stressed.

**BIO 205 Nutrition**

(3-0-3)

A study of the relationships of food and nutrition to health. An overview of the basic nutrition principles including the nutrients and how they function in the body, nutrient requirements, diet planning and energy balance. Current topics and controversies are examined.

Pre- or corequisite: CHE 103 or BIO 213 or instructor consent.

**BIO 209 Current Research Topics in Medical Sciences I**

(1-0-1)

Introduces students to topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in medical literature research, understanding scientific paper format, preparing technical presentations and public speaking.

Prerequisite: Biology or Health Sciences major or instructor consent.

**BIO 211 Principles of Biology**

(3-3-4)

Principles of modern biology emphasizing form and function of multicellular plants,

major invertebrate phyla and general vertebrate morphology and physiology.

**BIO 212 Principles of Biology**

(3-3-4)

Principles of modern biology emphasizing evolution, ecology, population genetics and behavior of organisms.

Prerequisite: BIO 211 with grade "C" or better, or with instructor consent.

**BIO 213 Principles of Biology**

(3-3-4)

Principles of modern biology emphasizing the biochemical basis for life processes, cell structure and function. Molecular genetics, cell reproduction, metabolism and form and function of microorganisms.

Prerequisite: BIO 212 with grade "C" or better, or with instructor consent.

**BIO 216 Introduction to Veterinary Medicine**

(3-3-4)

Covers many aspects of animal health and their impact on society. Discussions of husbandry, anatomy, preventive medicine, common diseases and behavioral problems of dogs, cats, horses and exotics. Some hands-on work with dogs, horses and wildlife is included.

**BIO 220 Cardiovascular Physiology**

(3-3-4)

Application of principles of fluid dynamics to the human vascular system. Detailed considerations of cardiac function and its regulation, analysis of flow in arterial, venous and capillary systems and integration of cardiovascular regulation.

Prerequisite: BIO 233.

**BIO 226 Introduction to Wildlife Rehabilitation**

(3-0-3)

Principles of wildlife rehabilitation including state and federal laws, medical terminology, basic anatomy, natural history and diet, form and function and euthanasia. Field captures, basic restraint, first aid, minimum housing requirements and zoonotic diseases are also included.

**BIO 227 Introduction to Forensic Science**

(3-3-4)

An entry-level course exploring the methodologies and procedures utilized by crime scene investigators and forensic laboratories.

Emphasis on crime scene investigation, recognition, documentation and collecting of physical evidence. Laboratory exercises provide hands-on opportunities supplementing lecture topics.

### **BIO 231 Human Anatomy and Physiology I**

(3-3-4)

Introduction to the systematic studies of human anatomy and physiology. Introduction to cytology and histology followed by the integumentary, skeletal, muscular and endocrine systems and the physiology of excitable tissues. The laboratory sessions emphasize human anatomy using models and human cadavers.

### **BIO 232 Human Anatomy and Physiology II**

(3-3-4)

A continuation of the systematic study of human anatomy and physiology. The nervous, cardiovascular and immune systems are studied. The laboratory sessions emphasize human anatomy using models and human cadavers. Dissections and physiological experiments are conducted.

Prerequisite: BIO 231 with grade "C" or better.

### **BIO 233 Human Anatomy and Physiology III**

(3-3-4)

Conclusion of the sequence in human anatomy and physiology. Digestive, respiratory, renal and reproductive systems are examined. Metabolism, human genetics and development are also studied. Laboratory sessions emphasize physiological experiments and human anatomy using models and human cadavers.

Prerequisite: BIO 232 with grade "C" or better.

### **BIO 235 Human Genetics**

(3-0-3)

Genetic concepts using human examples, including the molecular and cellular basis of inheritance, patterns of inheritance, basic pedigree analysis, mutation, single-gene and polygenic diseases and an introduction to genetic biotechnology.

Prerequisite: BIO 233.

### **BIO 247 Forensic Anthropology**

(3-3-4)

The morphological characteristics unique to the human skeleton that are used in

establishing population demographics will be discussed and demonstrated. The laboratories are designed as a hands-on experience applying the methodologies as presented in the lecture section.

### **BIO 261 Sophomore Project Proposal**

(1-0-1)

Review of the scientific method and scientific research procedures. Identification of a research topic. Preparation and presentation of a research proposal.

Prerequisite: BIO 213 or instructor consent.

### **BIO 262 Sophomore Project**

(1-9-4)

Completion of field, laboratory, or investigative project with agencies, faculty members, or industry. Includes data collection, analysis and presentation of report.

Prerequisite: BIO 261 or instructor consent.

### **BIO 313 Botany**

(2-6-4)

Field study and identification of the flora of the Pacific Northwest. Vascular plants will be emphasized; algae, fungi and bryophytes will be considered. Principles of plant classification and common plant families are taught. A plant collection is prepared.

Prerequisite: BIO 211 or instructor consent.

### **BIO 317 Invertebrate Biology**

(3-3-4)

Survey of invertebrate animals, including morphology, physiology, ecology and phylogeny; comparative anatomy of typical metazoan forms. Laboratory exercises focus on parasites and other economically important species. Intended for biology and pre-professional health majors.

Prerequisite: BIO 213 or equivalent.

### **BIO 325 Applied Aquatic Botany**

(2-3-3)

Ecology, taxonomy and economic significance of aquatic plants, including algae. Emphasis placed on determination of contaminants in the physical or biological environment.

Prerequisite: BIO 211.

### **BIO 327 General Ecology**

(3-3-4)

An examination of ecological principles applied to microhabitats, habitats and ecosystems. Includes community ecology, population ecology and resource analysis, supple-

mented by regional and local field exercises with training in measurement and collection of ecological components.

Corequisites: GEOG 105, BIO 111 and BIO 213.

### **BIO 331 Human Anatomy and Physiology I**

(3-6-5)

An in-depth systematic study of human anatomy and physiology of the integumentary, skeletal and muscular systems. Laboratories include histology, examination of human bones, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Pre-or corequisite: BIO 200 or instructor consent.

Prerequisites: BIO 213 and CHE 223, both with grade "C" or better.

### **BIO 332 Human Anatomy and Physiology II**

(3-6-5)

An in-depth systematic study of human anatomy and physiology of nervous, endocrine and cardiovascular systems. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisite: BIO 331 with grade "C" or better, or instructor consent.

### **BIO 333 Human Anatomy and Physiology III**

(3-6-5)

An in-depth systematic study of human anatomy and physiology of the lymphatic, respiratory, digestive, urinary and reproductive systems and an overview of embryology. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisite: BIO 332 with grade "C" or better, or instructor consent.

### **BIO 335 Cross-Sectional Anatomy**

(3-0-3)

Cross-sectional anatomy correlated with computer tomography, ultrasonography and magnetic resonance imaging.

Prerequisite: BIO 233.

### **BIO 336 Essentials of Pathophysiology**

(3-0-3)

Study of dynamic aspects of disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations,

normal immunology, neoplasia, inflammation and alterations of the respiratory and skeletal systems and Diabetes Mellitus.  
Prerequisites: BIO 200 and BIO 233.

### **BIO 337 Aquatic Ecology**

(2-6-4)

Aquatic ecosystems, patterns of development, population dynamics, diversity and energy cycles in marine and freshwater communities. Local and extended one- or two-day field trips to study different ecosystems off-campus. Procedures for sampling, data collection, numerical modeling and simulation studies of aquatic pollutants.

Prerequisites: BIO 212, BIO 327.

### **BIO 341 Medical Genetics**

(3-0-3)

Principles of heredity, chromosome mechanisms and molecular genetics applied to disease processes in humans. Review of case histories of selected inherited disorders. Discussion of genetic intervention therapies.  
Prerequisite: BIO 213 or BIO 233 or instructor consent.

### **BIO 342 Cell Biology**

(3-3-4)

Organelle organization, protein sorting, cell signaling, cytoskeletal functions, cell division mechanics and cell interactions in development and aging.

Prerequisite: BIO 213 or instructor consent.

### **BIO 345 Medical Microbiology**

(4-3-5)

Mechanisms of pathogenicity and virulence relating to disease-causing viruses, bacteria, fungi and other microorganisms. Host-parasite relationships and immunology, microbial physiology and genetics. Laboratory procedures and identification of selected bacteria and parasites.

Prerequisite: BIO 213 or BIO 233 or instructor consent.

### **BIO 346 Pathophysiology I**

(3-0-3)

Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations, normal and abnormal immunology, neoplasia, inflammation, atherosclerosis, hypertension, cardiac and vascular diseases.  
Prerequisites: BIO 200, and BIO 233 or BIO 333 with grade "C" or better, or instructor consent.

### **BIO 347 Pathophysiology II**

(3-0-3)

Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of alterations of respiratory function, liver and digestive system, neurologic, urinary, musculoskeletal disorders and Diabetes Mellitus.

Prerequisite: BIO 346 with grade "C" or better, or instructor consent.

### **BIO 351 Vertebrate Biology**

(3-3-4)

This course will explore both diversity and evolutionary history of the vertebrates. Emphasis placed on functional morphology and adaptive physiology as related to the evolutionary history of each vertebrate class. The laboratory will introduce basic vertebrate structure and morphological adaptation.

Prerequisite: BIO 213.

### **BIO 352 Developmental Biology**

(3-3-4)

This course will explore the developmental processes of selected invertebrate and vertebrate groups. The events of gametogenesis, fertilization, gastrulation, neurulation and post-embryonic development will be discussed. The role of differential gene expression in developmental pathways will be covered.

Prerequisite: BIO 213.

### **BIO 357 Introduction to Neuroscience**

(3-0-3)

This is an introductory course covering the organization and function of the human nervous system to build a foundation of general knowledge in neurobiology of such topics as sensory/motor systems, the brain and behaviors, the biological basis of brain development and learning and memory.

Prerequisite: BIO 232 or BIO 332 or PSY 339 or instructor consent.

### **BIO 409 Current Research Topics in Medical Sciences II**

(2-0-2)

A continuation of BIO 209 covering topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in medical literature research, understanding scientific paper format, preparing technical papers and presentations, and public speaking.

Prerequisite: BIO 209 or instructor consent.

### **BIO 426 Evolutionary Biology**

(3-0-3)

Principles of evolutionary science, including speciation, biogeography, biodiversity, population genetics, natural selection and coevolution.

Prerequisite: BIO 213 or instructor consent.

### **BIO 428 Animal Behavior**

(3-0-3)

The biological foundations of animal behavior are presented from an ethological and comparative psychology perspective. Emphasizes the evolution, development and physiological basis of behavior patterns and presents topics on learning, perception, orientation, communication and social behavior. (Cannot be taken for graduation credit by students who have taken PSY 428.)

Prerequisite: PSY 202 or BIO 213.

### **BIO 434 Data Analysis Methods**

(3-3-4)

Fundamental principles of data analysis from field projects, data archives and other sources. Analysis of variance, hypothesis testing, random processes. Regression and times series analysis. Discussion and practice of data visualization and presentation techniques.

Prerequisite: MATH 243 or MATH 361.

### **BIO 436 Immunology**

(3-3-4)

Cellular and humoral immunology including innate immunity, acquired immunity, antibodies, anatomy of immune response, production of effectors, adversarial strategies during infection, immunodeficiency and transplantation.

Prerequisite: BIO 213 or BIO 233 or instructor consent.

### **BIO 461, BIO 462 Human Cadaver Dissection**

(0-3-1)

Study of human anatomy utilizing cadaver dissection. Attention will be given to three-dimensional relationships of structures, appreciation of textural differences and development of palpation skills. Recognition of pathologic abnormalities and individual variations will be investigated.

Prerequisites: BIO 233 or BIO 333 and consent of instructor.

### **BIO 471 Senior Project Proposal Research**

(1-0-1)

Review of the scientific method and scien-

tific research procedures, identification of a research topic and preparation for writing a research proposal.

Prerequisite: BIO 262.

### **BIO 472 Senior Project Proposal**

(1-0-1)

Review of research procedures including research ethics, project management, instrumentation, field methods for data acquisition and data analysis. Development and presentation of a research proposal.

Prerequisite: BIO 471.

### **BIO 473 Senior Project Data Collection**

(1-6-3)

Independent completion of field, laboratory, or investigative project in collaboration with agency, faculty or industry professionals. Includes data collection, initial analyses and presentation of initial findings.

Prerequisite: BIO 472.

### **BIO 474 Senior Project Data Analysis and Presentation**

(0-5-2)

Application of appropriate statistical methods to data collected by students as part of their senior projects. Advanced techniques introduced as appropriate. Presentation of senior project data. Emphasis on the design, preparation and delivery of effective written and oral presentations.

Prerequisite: BIO 473; BIO 434 or MATH 362.

### **BIO 484 Sustainable Human Ecology**

(2-6-4)

Investigation of global interconnections between humans and natural systems through the study and application of ecological principles. Ethical and ecological considerations are used to solve complex environmental problems. Laboratories involve field work with local experts.

Prerequisite: BIO 327 or CIV 315 or instructor consent.

### **BIO 485 Klamath Bioregional Studies**

(3-0-3)

The Klamath River Bioregion from an integrated ecological perspective. Team project in assessing current socioeconomic, cultural and ecological conditions in the bioregion and developing management strategies for sustainable resource use.

Prerequisites: ENV 225 and BIO 327, or instructor consent.

## **(BUS) Business**

### **BUS 101 Introduction to Business**

(3-0-3)

Introduction to the basic aspects of business, marketing, management, production, accounting, and finance; various forms of business ownership; role of business in the economy, and society. Discussion of cultural, ethical, current events, and trends affecting business. Exposure to career opportunities.

### **BUS 107, BUS 207, BUS 307, BUS 407 Seminar**

(Hours to be arranged each term.)

### **BUS 215 Principles of Management**

(3-0-3)

Introduction to the history of management. Emphasis on the management functions of planning, organizing, directing, and controlling; existing and emerging managing theories, social responsibilities and business ethics. (Cannot be taken for graduation credit by students who have taken BUS 304 or BUS 317.)

### **BUS 223 Marketing I**

(3-0-3)

Principles that drive the integration of the marketing mix (product, price, place, promotion) to meet the needs and wants of consumer and business markets. Function of market research and the study of market opportunities to grow and sustain organizations.

### **BUS 226 Business Law**

(3-0-3)

The fundamentals of business law: the structure of federal and state courts and agencies, their decision processes; the legal structure of modern business organizations including closely and publicly held corporations, partnerships, limited partnerships, nonprofit corporations, sole proprietorships and limited liability companies; contract law; Uniform Commercial Code; tort law and its implications for business; administrative law; and criminal law as it applies to business and industry.

### **BUS 256 Business Communication**

(2-3-3)

Emphasis on effective content, structure, tone, and visual format for both internal and external communication. Students will com-

pose various commonly occurring business documents achieving effectiveness in design, organization, content, and style, applying current graphic design and visual-design principles.

Prerequisites: BUS 101, or BUS 215, or BUS 223, and WRI 122.

### **BUS 304 Engineering Management**

(3-0-3)

The engineering management process. The unique aspects of managing "knowledge workers." The manager's role in planning, organizing, leading and controlling. Managing design and new products development, materials and inventory. Organizational styles, structures and policies. Human resource management for individuals and groups. (Cannot be taken for graduation credit by students who have taken BUS 215 or BUS 317.)

Prerequisite: Junior standing or instructor consent.

### **BUS 308 Principles of International Business**

(3-0-3)

Introduction to international business fundamentals in the areas of cultural, ethical, legal and economic environments, international finance tools and instruments, international trade theory, manufacturing strategies, international supply chain management, country selection, exchange rate mechanics and international human resource management.

Prerequisite: WRI 121.

### **BUS 309 Introduction to Tourism**

(3-0-3)

Introduction to tourism industry. Topics include major components of tourism, service suppliers, travel, transportation, accommodations, food and beverage, attractions, entertainment, destinations and impacts of tourism on society.

### **BUS 313 Health Care Systems and Policy**

(3-0-3)

This course will explore the U.S. Health System focusing on its historical development, current configuration and possible future direction. Included will be the study of health system development, key influencers, accessibility, financing, changing components and the effects the system has on patients, providers, financiers, employers, government and insurers. Particular attention will be paid to the future direction of healthcare and what

parts of the system are likely to change.  
Prerequisite: WRI 227.

**BUS 314 Entrepreneurship I**  
(3-0-3)

Start-up concepts and models. Identification and assessment of the critical factors that lead to a successful start-up. Focus on small business idea generation and the analysis of market opportunities in B2C and B2B markets. Conduct a market and financial feasibility study.

Prerequisites: BUS 215, or BUS 304, or BUS 317; ACC 203 and BUS 223 or instructor consent.

**BUS 316 Total Quality in Health Care**  
(3-0-3)

The health care quality management process, contemporary issues and trends involved with quality control, organization structures, policies, human factors and teamwork.  
Prerequisite: Junior standing.

**BUS 317 Health Care Management**  
(3-0-3)

The health care manager's role in planning, organizing, leading and controlling. Special emphasis on the unique and complex issues involved in health care management. Organizational structures. Strategic and operational planning. Health care finance and budgeting. The future of management. (Cannot be taken for graduation credit by students who have taken BUS 215 or BUS 304.)  
Prerequisite: Junior standing or instructor consent.

**BUS 318 Marketing II**  
(3-0-3)

Advanced study of markets with a focus on the motivational and behavioral characteristics of consumers. Study and apply analytics, technology and data-driven decision making in the formation of a customer centered marketing and marketing communication strategy.

Prerequisites: BUS 223, PSY 201.

**BUS 319 Integrated Marketing Communication**  
(3-0-3)

Integrated marketing communication promotion mixes and strategies, tactics and media to influence buyer behavior and brand equity with various markets. Application of marketing communication tools through

the development of a promotional campaign with goals, core themes, designs, budgets and specifications.

Prerequisite: BUS 223 or BUS 337.

**BUS 325 Finance Management**  
(3-0-3)

Basic issues and methodology of financial management. Emphasis placed on working capital management, sources of short-term and long-term funds and optimal capitalization of the firm.

Prerequisites: BUS 215; ACC 203.

**BUS 326 Sales and Sales Management**  
(3-0-3)

Fundamentals of selling products and services and sales management in various markets, buying behavior and processes, adaptive selling skills, establishing and selling the value proposition, role playing and sales simulations, after sale considerations and review of current customer relationship management systems.

Prerequisite: BUS 223.

**BUS 328 Health Care Accounting and Finance**  
(3-0-3)

General principles and application of managerial accounting in health care organizations. Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Revenue cycle, sources and systems analysis of variance, cost effectiveness and managerial reporting are examined.

Prerequisite: ACC 201.

**BUS 331 Personal Finance**  
(3-0-3)

Introduction to the basic principles of personal financial planning and budgeting. Includes banking services, consumer credit, asset purchases, insurance and the fundamentals of investments and retirement planning.

**BUS 335 Entrepreneurship II**  
(3-0-3)

Complete a full marketing, financial and operational business plan for a new business venture. Students will learn and apply fundamental strategic decisions for small business entrepreneurs in all facets of starting, operating and growing a business.

Prerequisite: BUS 314 or instructor consent.

**BUS 337 Principles of Health Care Marketing**  
(3-0-3)

Fundamentals of health care marketing covering strategy, planning process, assessment, marketing actions, branding and evaluation.

**BUS 345 Fraud Examination**  
(3-0-3)

Study of fraud and fraud investigative techniques. Topics include nature of fraud, types of fraud, fraud prevention, detection and investigation methods and legal follow-up procedures.

**BUS 347 Geography of Travel and Tourism**  
(3-0-3)

Study of those destinations around the world that are most important to travelers including the World Heritage sites. Topics include fundamentals of geography, both physical and cultural, and major tourism destinations.

**BUS 349 Human Resource Management I**  
(3-0-3)

Roles and responsibilities of strategic HR management, basic labor and safety laws, employee rights, job analysis and description. Workforce planning, recruitment and selection. Training, development and performance evaluation. Compensation and benefits administration.

Prerequisite: BUS 215 or BUS 304 or BUS 317 or instructor consent.

**BUS 350 Hospitality Management**  
(3-0-3)

Study of management principles in the tourism and hospitality industry. Topics include managing growth and change in the hospitality industry, major functional areas in hotels and restaurants and the economic aspects of the industry.

**BUS 356 Business Presentations**  
(3-3-4)

Design, preparation and delivery of effective business presentations. Emphasis on integration of skills in speech and digital communication software to deliver effective, informative and persuasive presentations in any business or organization.

Prerequisites: SPE 111, WRI 122.



**BUS 358 Marketing for Hospitality and Tourism**

(3-0-3)

Study of marketing principles as they apply to the tourism and hospitality industry. Topics include marketing in strategic planning, the marketing environment, marketing information systems and marketing research, consumer buying behavior, market segmentation, product pricing, distribution channels and internet marketing. (Cannot be taken for graduation credit by students who have taken BUS 399 Special Topics: Marketing Tourism.)

**BUS 385 Ecotourism**

(3-0-3)

Study of sustainability principles as they apply to the tourism and hospitality industry. Topics include the ecotourism environment, the economic, sociological and cultural impacts of ecotourism, ecotourism as a business and a world survey of ecotourism sites. Prerequisite: WRI 121.

**BUS 387 International Human Resource Management**

(3-0-3)

In-depth review of human resource selection, training for international assignments, managing the expatriate manager, compensation packages, repatriation training, women and dual-career couples, conflicting interests of parent company and host country and managing joint ventures. Prerequisite: BUS 308.

**BUS 397 Human Resource Management II**

(3-0-3)

Theories of organized labor, labor laws on diversity, collective bargaining, management and workforce relationships, HRM practices for job descriptions, motivation, engagement assessment, career development. Prerequisite: BUS 349.

**BUS 399 Marketing Special Topics**

(3-0-3)

Concentrated areas of marketing will be taught on a rotating basis: business to business, hospitality and travel, entertainment and sports, high tech, direct marketing and public relations. Prerequisite: BUS 223.

**BUS 405 Reading and Conference**

(Hours to be arranged each term.)

**BUS 415 Environmental Regulation**

(3-0-3)

Legislation and enforcement activities involving natural and industrial environments. Conservation laws, land use and planning, responsibilities of regulatory agencies, review of current legislative actions and judicial decisions. Prerequisite: BIO 112 or BUS 226.

**BUS 416 Environmental Management**

(3-0-3)

Review of contemporary management issues and business practices related to land use management and planning, ecological planning, environmental quality engineering and control and natural resource economics. Prerequisites: BUS 415 and ECO 201 or BIO 112.

**BUS 420 Applied Management Internship**

(0-9-3)

This course provides credit for an approved internship related to the student's program. Students work in a supervised setting where they receive training to develop career related skills while applying college learned theory. This course can substitute for BUS 496. Prerequisites: ACC 325, WRI 227, Senior standing and approval from senior project advisor.

**BUS 434 Global Marketing**

(3-0-3)

Comprehensive study of global business issues that develop strategic visions for market entry in emerging and developed countries, analyzing financial and pricing considerations, evaluating strategies of export versus local manufacturing, developing a marketing program that demonstrates implementation of global business principles. Prerequisites: BUS 223, BUS 308.

**BUS 435 Marketing III**

(3-0-3)

Marketing management strategies within a marketing centric business or organization, including the development of new products and services in response to market demands. Development of collaborative strategies in distribution, pricing and product/service mixes for new projects, services and line extensions. Prerequisite: BUS 318.

**BUS 441 Leadership I**

(3-0-3)

Role of managers and leaders within an organization. Recognizing styles, competencies and traits of a leader and strategic application within a working environment through case analysis and discussion, introduction and development of personal leadership skills. Prerequisite: BUS 349 or instructor consent.

**BUS 442 Leadership II**

(3-0-3)

Leadership in developing and communicating vision/mission, values, setting ethical standards. Leading and developing multi-levels of managers. Mentoring high potential managers and transformational leaders. Leadership during conflict, change and diversity. The role of the leader in organizational development. Prerequisite: BUS 441.

**BUS 447 Controversial Issues in Management**

(3-0-3)

Examination of the many controversial issues in management such as social responsibility, whistle blowing, outsourcing, drug testing, Affirmative Action and so on. Students will study opposing views and arguments from a variety of viewpoints. Discussion and debate develops critical thinking skills. Prerequisites: BUS 215, BUS 304 or BUS 317; PSY 347, WRI 122, and junior standing.

**BUS 456 Business Research Methods**

(3-0-3)

Research design, exploration and proposals. Hypotheses formulation and testing. Data sources, collection and analysis. Survey design, sampling and census techniques. Library and online information retrieval sources. Effective search strategies. Research reporting. Prerequisites: MATH 361, WRI 227.

**BUS 457 Business Research Methods II**

(3-0-3)

Emphasizes quantitative elements of research methods including presenting and describing information, drawing conclusions about populations using sample information; and improving business processes. Prerequisites: BUS 215 or BUS 304 or BUS 317 and MATH 361 or MATH 243.

**BUS 467 Service Management**

(3-0-3)

The nature of service and service encounters, strategy and competitiveness. Design of service systems. Facilities location, design and layout. Service quality and continuous improvement.

Prerequisite: BUS 215 or BUS 317.

**BUS 473 Marketing Plan Development**

(3-0-3)

Development of an in-depth marketing plan for a local community business. All aspects of the plan will be covered in detail.

Prerequisites: BUS 223, BUS 319.

**BUS 478 Cases in Strategy and Policy**

(3-0-3)

Comprehensive study and analysis of businesses and/or case studies. Evaluation of strategic and operational decision making. Performance analysis in areas of finance, marketing and social performance.

Prerequisites: ACC 203, WRI 227, senior standing.

**BUS 496 Senior Project**

(1-6-3)

Senior students develop, plan, and initiate a project for a client or an independent research project. Topics include task definition, dealing with client contact, client confidentiality, and time estimation and management. Instructor functions as a consultant.

Prerequisites: ACC 325; WRI 227.

**BUS 497 Senior Project**

(1-6-3)

Students complete project started in BUS 496 including preparing a detailed project report and delivering a final PowerPoint presentation. Periodic progress reports required. Instructor functions as a consultant.

Prerequisite: BUS 420 or BUS 496 with a grade of "C" or better. Pre or corequisite: BUS 356.

**BUS 525 Marketing Management**

(3-0-3)

Topics include concepts related to the marketing management function of segmentation, brand equity, customer value analysis, integrated marketing, internal marketing and various organizational roles in moving a firms' products or services to end-users profitability and with value to the customers.

**(CE) Civil Engineering****CE 107, CE 207, CE 307, CE 407****Seminar**

(Hours to be arranged each term.)

**CE 203 Engineering Graphics**

(1-6-3)

Graphical communication in civil engineering using computer-aided drafting and design software. Includes development of drawings related to civil engineering projects such as roads, subdivisions and buildings, development of scaled plots and reading of engineering drawings.

**CE 205 Computational Methods**

(2-0-2)

Solve applied problems involving formulas, functions, summation and iteration using Excel and VBA. Use built-in functions and graphing capabilities.

Prerequisite: MATH 112 with grade "C" or better.

**CE 208 Principles of Professional Practice**

(4-0-4)

Civil engineering professional practice topics including project acquisition, development, management and delivery. Business in civil engineering including ethics, economics, leadership, communication and legal matters. Current and emerging trends in practice.

Prerequisites: ENGR 102 and MATH 111, each with grade "C" or better.

**CE 212 Civil Engineering Materials**

(3-3-4)

Study of the engineering properties of soil as well as portland cement and asphaltic concretes. Field and laboratory testing methods for classifying soil. Mix design of concretes.

Prerequisites: ENGR 102 and MATH 111, each with grade "C" or better.

**CE 299 Independent Studies**

(Hours to be arranged each term.)

**CE 311 Introduction to Geotechnical Engineering**

(4-3-5)

Soil permeability, seepage, filters, effective stress, consolidation, settlement, shear strength, slope stability, stresses in soils, and stresses under loaded areas. Includes laboratory testing.

Prerequisites: CE 212, ENGR 213, MATH 254N, and PHY 222, each with grade "C" or better.

**CE 312 Earth Pressures and Foundations**

(3-0-3)

Analysis and design of shallow footings, deep foundations including piles, caissons and earth retaining structures design. Use of computer applications for design of these structures.

Prerequisite: CE 311 with grade "C" or better.

**CE 331 Structural Analysis**

(3-3-4)

Structural loads according to ASCE 7. Analysis of statically determinate trusses and frames. Shear and moment diagrams, deflections, and influence lines for statically determinate structures. Analysis of statically indeterminate structures by force and displacement methods. Software applications emphasized in labs.

Prerequisites: ENGR 213, MATH 254N and PHY 222 each with grade "C" or better.

**CE 341 Elementary Structural Design**

(4-3-5)

Fundamentals of structural element design: emphasis on structural steel, reinforced concrete, and timber beams and short columns as well as reinforced masonry lintels and walls due to gravity loads. Labs include construction, material and destructive testing, and software applications.

Prerequisite: CE 331 with grade "C" or better.

**CE 351 Introduction to Transportation Engineering**

(3-3-4)

Introduction to the design, planning, operation, management and maintenance of transportation systems. Principles for planning multi-modal transportation systems, layout of roadways, traffic flow modeling and capacity analysis.

Prerequisites: CE 203, ENGR 211, GME 161, MATH 254N and PHY 222, each with grade "C" or better.

**CE 354 Traffic Engineering**

(2-3-3)

Principles of traffic engineering and operation, traffic engineering studies, signalized

intersection design, traffic analysis software.  
Prerequisites: CE 351 and MATH 361, each with grade "C" or better.

### **CE 371 Closed Conduit Design**

(3-3-4)

Population and factors influencing water supply demands, fire flows, peaking factors and storage requirements. Flows in pressure pipe systems, pipe networks analysis and design techniques. Estimation of wastewater flows including I/I considerations. Gravity-fed collection system design, construction and maintenance.

Prerequisites: ENGR 318, CE 205, MATH 254N and PHY 222, each with grade "C" or better.

### **CE 374 Hydrology**

(3-3-4)

Study of the hydrologic cycle, measurement of rainfall, runoff and streamflow. Curve fitting, hydrographic analysis, statistical analyses of extreme flows, flood routing and storage capacity. Runoff modeling and design of hydrologic structures and systems.

Prerequisites: CE 371 and MATH 361, each with grade "C" or better.

### **CE 401 /COM 401 Civil Engineering Project I**

(3-6-5)

First term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive two credit hours in civil engineering (CE 401) and three credit hours in communication for general education (COM 401).

Prerequisite: WRI 227; advisor consent.

### **CE 402/COM 402 Civil Engineering Project II**

(5-6-7)

Second term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive four credit hours in civil engineering (CE 401) and three credit hours in communication for general education (COM 401).

Prerequisites: CE 401 and COM 401, each with grade "C" or better.

### **CE 405 Sustainability and Infrastructure**

(3-0-3)

Integrating sustainability concepts and key social, economic and environmental issues and processes relevant to civil engineering. Sustainable design practices in each civil

engineering sub-discipline will be studied and existing and proposed infrastructure projects will be evaluated.

Corequisite: CE 401.

### **CE 408 Workshop**

(Hours to be arranged each term.)

### **CE 411 Engineering Geology**

(3-0-3)

A study of the interaction of geology, including structure, geologic processes (current and historic), lithology and mineralogy with civil engineering structures.

Prerequisites: GEOL 201 and CE 311, each with grade "C" or better.

### **CE 413 Advanced Soils**

(2-3-3)

Advanced laboratory and in situ techniques for characterizing soils for use in civil engineering applications.

Prerequisites: GEOL 201 and CE 311, each with grade "C" or better.

### **CE 432 Structural Loading and Lateral Forces**

(4-0-4)

Gravity loads (dead, live, roof live, and snow) and lateral loads (wind and seismic) according to ASCE 7 and Oregon Structural Specialty Code. Introduction and design of basic lateral force resisting systems.

### **CE 442 Advanced Reinforced Concrete Design**

(3-0-3)

Design, analysis, and detailing of reinforced concrete elements, including: T-beams, doubly-reinforced beams, continuous beams, shear walls, slender columns, slabs, footings, and moment frames. Seismic resistance and the development, anchorage, and splicing of steel reinforcement are introduced.

Prerequisite: CE 341.

### **CE 444 Intermediate Steel Design**

(4-0-4)

Design of structural steel tension members, frameworks, composite beams, and bolted and welded connections. Application of the AISC Steel Construction Manual structural stability provisions and software applications.

Prerequisite: CE 341 with grade "C" or better.

### **CE 447 Masonry Design**

(3-0-3)

Analysis and design of masonry beams, walls

and columns using computer solutions with emphasis on lateral design considerations.

Prerequisite: CE 341 with grade "C" or better and gravity elements with software applications as appropriate.

### **CE 448 Timber Design**

(3-0-3)

Analysis and design of simple (determinate) timber beams, columns, trusses and connections using dimensioned lumber, plywood and laminated members, with an emphasis on lateral force design. Computer solutions introduced.

Prerequisite: CE 341 with grade "C" or better.

### **CE 456 Pavement Engineering**

(2-3-3)

Hot mixed asphalt materials testing and mixture design. Methods of manufacture, transport and placement of rigid and flexible pavements. Structural design of rigid and flexible pavements. Pavement rehabilitation and management.

Prerequisites: CE 212, ENGR 213 and CE 351, each with grade "C" or better.

### **CE 457 Transportation and Land Development**

(2-3-3)

Study of interactions between land development activity and the transportation network. Application of planning and engineering design techniques to manage the impacts of development upon the transportation system.

Prerequisite: CE 354 with grade "C" or better.

### **CE 473 Groundwater**

(3-0-3)

Offers an introduction to the physical properties and principles of groundwater. Topics include groundwater and the hydrologic cycle, fundamental fluid flow laws, groundwater resource evaluation, and groundwater contamination.

Prerequisite: CE 311 with grade "C" or better.

### **CE 481 Environmental Engineering I**

(3-0-3)

Introduction to environmental engineering principles, fundamental concepts and supporting calculations. Physical, chemical and biological elements of the natural environment. Environmental impacts of anthropogenic activities. Control and pollution prevention technologies. Legal and regulatory

framework governing environmental management.

Prerequisites: CHE 221 and ENGR 318, each with grade "C" or better.

### **CE 489 Treatment Wetlands**

(3-0-3)

Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and stormwater treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies.

Prerequisites: CHE 221 and ENGR 318, each with a grade "C" or better.

### **CE 499 Independent Studies**

(Hours to be arranged each term.)

### **CE 511 Seepage and Earth Structures**

(3-0-3)

Covers material related to analyzing steady state and transient seepage conditions, erosion and piping, and the stability of earth slopes and embankments.

Prerequisites: GEOL 201, CE 311, CE 312, all with grade "C" or better.

### **CE 512 Earthquake Engineering**

(3-0-3)

This course describes basic earthquake engineering in terms of regional seismicity, predicted ground motions, probabilistic methods for seismic analysis, liquefaction and steady-state shear strength analysis.

Prerequisites: GEOL 201, CE 311, both with grade "C" or better.

### **CE 513 Deep Foundations**

(3-0-3)

This course covers the design of deep foundation systems including driven piles and drilled shafts. These systems are designed for both axial and lateral loading.

Prerequisites: GEOL 201, CE 311, CE 312, all with grade "C" or better.

### **CE 522 Advanced Shear Strength of Soils**

(3-0-3)

This course is designed to give students an advanced understanding of the shear strength of soils including drained and undrained strength of fine and coarse grained soils.

Prerequisites: GEOL 201, CE 311, each with grade of "C" or better.

### **CE 533 Structural Matrix Analysis**

(3-0-3)

Static analysis of determinate and indeterminate structures using the direct stiffness method with heavy emphasis on computer models and solutions. Students will design and develop their own structural analysis program.

Prerequisites: CE 331 and MATH 341, each with grade "C" or better.

### **CE 534 Advanced Solid Mechanics**

(3-0-3)

Three-dimensional stress and strain, failure theories, elasticity and plasticity, curved beams, beams on elastic foundations, unsymmetric bending and shear centers.

Prerequisites: CE 442 or CE 444 with grade "C" or better.

### **CE 535 Structural Dynamics**

(2-3-3)

Analysis of single degree of freedom structural systems to harmonic and general dynamic loading. Free vibrating and forced vibration of multiple degree of freedom systems, modal superposition, earthquake engineering, current IBC methods.

Prerequisite: CE 331 with grade "C" or better.

### **CE 539 Highway Bridge Rating**

(2-3-3)

Introduction to bridge types, bridge design philosophies and bridge rating procedures. Load rating of short-span highway bridges using AASHTO provisions and ODOT procedures. Software applications.

Prerequisites: CE 442 and CE 444, each with grade "C" or better.

### **CE 542 Prestressed Concrete Design**

(3-0-3)

Analysis, behavior, and design of prestressed concrete structures and elements including beams, composite beams, box-girders and flanged beams, continuous beams and indeterminate frames, slabs, and compression members. Precast member design and behavior also introduced.

Prerequisite: CE 442 with grade "C" or better.

### **CE 544 Advanced Steel Design**

(3-0-3)

Torsion members, plate girders, and lateral force resisting systems. AISC Seismic Provisions for Structural Steel Buildings. Advanced

topics in structural stability and connection design.

Prerequisite: CE 444 with grade "C" or better.

### **CE 549 Bridge Design**

(3-3-4)

Design and analysis of short and medium-span highway bridge superstructures including reinforced concrete slab bridges, steel deck girder bridges, and prestressed concrete girder bridges. Software applications.

Prerequisites: CE 442 and CE 444, each with grade of "C" or better.

### **CE 550 Transportation Structures**

(2-3-3)

Design and analysis of common transportation structures including culverts, sign structures, light poles, and railings according to current AASHTO provisions and ODOT procedures. Software applications.

Prerequisites: CE 442 and CE 444, each with grade of "C" or better.

### **CE 551 Geometric Design of Roadways**

(2-3-3)

This course will provide students with an understanding of the principles and techniques of highway design. Topics include laying out potential routes, design of the alignment and intersections, evaluation of earthwork requirements, and safety considerations.

Prerequisite: CE 354 with grade "C" or better.

### **CE 554 Advanced Traffic Engineering**

(2-3-3)

Traffic studies including volume, speed, travel time and delay. Freeway and rural highway facility design, signing and marking. Urban unsignalized and signalized intersection design. Arterial planning and design.

Prerequisite: CE 354 with grade "C" or better.

### **CE 558 Transportation Safety**

(4-0-4)

Safety concepts in highway engineering including highway design, operation, and maintenance, as well as human factors, statistical analysis, traffic control and public policy. Design concepts of intersections, interchanges, signals, signs and pavement markings.

Prerequisite: CE 354 with grade "C" or better.

**CE 568 Travel Demand Modeling**

(3-3-4)

Introduction to travel demand analysis and forecasting. Models studied from a theoretical, applied and practical perspective. Students will become familiar with the traditional four-step travel forecasting process, including model development, application and interpretation of outputs.

Prerequisite: CE 351 with grade "C" or better.

**CE 571 Open-Channel Hydraulics**

(3-3-4)

Application of basic principles of hydraulics to open channel flow. Theory and analysis of critical, uniform, unsteady, and gradually and rapidly varied flow. Flow characteristics in natural and constructed channels. Computer modeling of open-channel flow systems. Floodplain delineation methods.

Prerequisite: CE 371 with grade "C" or better.

**CE 572 Hydrometry**

(2-3-3)

Measurement of variables in the hydrologic cycle. Principles, methods, instruments, and equipment for obtaining surface and ground water quantity and quality data in nature to support design and water management efforts.

Prerequisite: CE 374 with grade "C" or better.

**CE 574 Environmental River Mechanics**

(2-3-3)

River response to watershed modification and infrastructure, including introduction to fluvial geomorphology, sediment transport and stream restoration. Management of waterways and floodplains.

Prerequisite: CE 374 with grade "C" or better.

**CE 576 Applied Hydraulic Design**

(2-3-3)

Flow analysis for constructed channels; principles of hydraulic design of culverts, bridge waterway openings, highway inlets, rundowns, and appurtenant water control structures. Computer modeling of bridge and culvert hydraulics. Design of appropriate Best Management Practices (BMPs) for storm-water quality and erosion control. Design project.

Prerequisite: CE 374 with grade "C" or better.

**CE 586 Water and Wastewater Treatment**

(4-0-4)

Water and wastewater characteristics, chemistry, quality and supply. Engineering design and water demand projection. Theory of individual treatment processes, design guidelines for components for water/wastewater treatment.

Prerequisites: CHE 221 and CE 371, each with grade "C" or better.

**CE 587 Environmental Remediation Technologies**

(3-0-3)

Potential human activity effects on natural systems (air, soil, water). Physical, chemical, and biological processes in contaminant fate and transport. Regulatory aspects of environmental assessment, monitoring, and prioritization. Remediation/restoration technologies and strategies.

Prerequisite: CE 481 with grade "C" or better.

**(CHE) Chemistry****CHE 101 Elementary Chemistry**

(3-0-3)

A brief presentation of introductory chemical concepts including atomic structure, the chemical equation, the behavior of gases, the chemistry of solution and acid-base chemistry. For students with good knowledge of algebra.

Pre- or corequisite: MATH 100.

Corequisite: CHE 104 (lab).

**CHE 102 Elementary Chemistry**

(3-0-3)

A continuation of CHE 101 with emphasis on organic chemistry. The role of organic chemistry in life and industrial processes is discussed.

Prerequisite: CHE 101 or instructor consent.

Corequisite: CHE 105 (lab).

**CHE 103 Elementary Chemistry**

(3-0-3)

A continuation of CHE 102 with emphasis on biochemistry. The organic chemistry of biochemicals including proteins, carbohydrates and fats, as well as nucleic acids is discussed. Basic elements of metabolism are also explored.

Prerequisite: CHE 102 or instructor consent.

Corequisite: CHE 106 (lab).

**CHE 104 Elementary Chemistry Laboratory**

(0-3-1)

Lab accompanying class content in CHE 101.

Corequisite: CHE 101.

**CHE 105 Elementary Chemistry Laboratory**

(0-3-1)

Lab accompanying class content in CHE 102.

Corequisite: CHE 102.

**CHE 106 Elementary Chemistry Laboratory**

(0-3-1)

Lab accompanying class content in CHE 103.

Corequisite: CHE 103.

**CHE 107, CHE 207, CHE 307, CHE 407 Seminar**

(Hours to be arranged each term.)

**CHE 201 General Chemistry**

(3-0-3)

Atomic and molecular structure, chemical bonding, chemical and physical properties, introduction to stoichiometry and thermochemistry are presented.

Prerequisite: High school chemistry or CHE 101 equivalent.

Pre- or corequisite: MATH 111.

Corequisite: CHE 204 (lab).

**CHE 202 General Chemistry**

(3-0-3)

A continuation of CHE 201. This course discusses the behavior of gases, liquids and solids, the properties of solutions, chemical kinetics and an introduction to chemical equilibrium.

Prerequisites: CHE 201 and CHE 204 (lab).

Corequisite: CHE 205 (lab).

**CHE 203 General Chemistry**

(3-0-3)

A continuation of CHE 202. This course continues the discussion of chemical equilibrium and its applications in aqueous solutions including pH, buffers, solubility and complexation. Also included are oxidation-reduction processes and electrochemistry, thermodynamics and an introduction to nuclear chemistry.

Prerequisites: CHE 202 and CHE 205 (lab).

Corequisite: CHE 206 (lab).

**CHE 204 General Chemistry Laboratory**

(0-3-1)

Lab accompanying class content in CHE 201.

Corequisite: CHE 201.

**CHE 205 General Chemistry Laboratory**

(0-3-1)

Lab accompanying class content in CHE 202.

Corequisite: CHE 202.

**CHE 206 General Chemistry Laboratory**

(0-3-1)

Lab accompanying class content in CHE 203.

Corequisite: CHE 203.

**CHE 210 Clinical Pharmacology**

(3-0-3)

The drug action of selected pharmaceutical. Emphasis is placed on drug interactions, routes of administration and effects on body systems.

Prerequisites: BIO 231, BIO 232.

**CHE 221 General Chemistry**

(4-3-5)

Components of matter, atomic and molecular structure, chemical bonding, stoichiometry, major classes of chemical reactions, gases and kinetic-molecular theory, thermo-chemistry and quantum theory and atomic structure.

Prerequisite: CHE 101, high school chemistry or equivalent.

Corequisite: MATH 111.

**CHE 222 General Chemistry**

(4-3-5)

A continuation of CHE 221. Models of chemical bonding, shape of molecules, theories of covalent bonding, liquids and solids, properties of mixtures, bonding and reactivity and chemical kinetics.

Prerequisite: CHE 221.

**CHE 223 General Chemistry**

(4-3-5)

A continuation of CHE 222. Emphasis on chemical equilibrium and its applications in aqueous solutions including acid-base, solubility and complexation reactions. Buffers, pH, thermodynamics, oxidation-reduction reactions, electrochemistry and nuclear reactions and their applications.

Prerequisite: CHE 222.

**CHE 235 Streamwater Chemistry and Sampling**

(1-6-3)

Introduction to water quality and automated stream water sampling. Laboratories focus on multiparameter water quality data sonde technologies. Calibration, operational use, discrete measurements and automated data logging are discussed. Field exercises include project planning, data validation, safety and constraint assessments.

Prerequisite: CHE 201 or CHE 221 or instructor consent.

**CHE 260 Electrochemistry for Renewable Energy Applications**

(3-3-4)

Development of electrochemistry concepts, including thermodynamics, reaction kinetics, charge transport and mass transport. Topics are presented in the context of fuel cells, electrolysis, electroplating and batteries. Also discussed, the chemistry of hydrogen; its properties, production, storage and transportation.

Prerequisite: CHE 202 or CHE 222.

**CHE 315 Environmental Chemistry and Toxicology**

(3-0-3)

Mechanisms and toxicological effects of chemical reactions in water, soil and air. Global and regional concerns about atmospheric and marine contaminants, thermal pollution, pesticide and heavy metal disposal, radioisotope properties and effects of pollutants on living organisms. Organic nomenclature and selected biochemistry principles.

Prerequisite: CHE 331 or instructor consent.

**CHE 325 Soil Science**

(3-3-4)

Nature, properties and distribution of soils and their relationship to the influence of vegetation, climate, landforms and human activity. Understanding how soils form and how and why they vary horizontally across the landscape and vertically with depth. Emphasis upon North American patterns. Required field trips and labs.

Prerequisite: CHE 202 or instructor consent.

**CHE 331 Organic Chemistry I**

(3-3-4)

The structures and reactions of carbon compounds with emphasis on thermodynamics, reaction pathways and spectroscopy.

Prerequisite: CHE 223.

**CHE 332 Organic Chemistry II**

(3-3-4)

Organic stereochemistry with emphasis on biologically important molecules.

Prerequisite: CHE 331.

**CHE 333 Organic Chemistry III**

(3-3-4)

Free radical chemistry, pharmaceutical chemistry and the mechanistic aspects of enzymatic catalysis.

Prerequisite: CHE 332.

**CHE 341 Instrumental Methods/ Data Acquisition I**

(3-3-4)

An introduction to the theory and practical applications of computer/instrument interfacing and data acquisition techniques and software. Includes a survey of optical measurement techniques.

Prerequisite: CHE 235.

Corequisite: MIS 115 or CST 116 or instructor consent.

**CHE 342 Instrumental Methods/ Data Acquisition II**

(3-3-4)

Principles and techniques of instrumental methods and data analysis. Methods appropriate for chemical analysis including spectroscopy, gas chromatography, potentiometric and flame photometric methods. Emphasis on sample preparation, instrumental response, sensitivity and accuracy.

Prerequisite: CHE 341.

**CHE 345 Corrosion Chemistry**

(3-0-3)

A survey of the chemical kinetics and thermodynamics of corrosion, the various types of corrosion, inhibition of corrosion and industrial applications.

Prerequisites: CHE 101, CHE 201, PHY 202 or instructor consent.

**CHE 346 Corrosion Chemistry Laboratory**

(0-3-1)

Laboratory accompanying CHE 345. Providing practical experience with electrochemical equipment used to measure corrosion processes.

Corequisite: CHE 345.

**CHE 350 Clinical Pharmacology for Nuclear Medicine**

(3-0-3)

Principles of pharmacokinetics, pharma-

codynamics and a survey of the major drug families developing familiarity with commonly prescribed drugs, their clinical application, mechanism of action and side effects. Emphasis is on drugs of importance to nuclear medicine and the common radio-pharmaceuticals.

Prerequisite: BIO 233 or BIO 333 or instructor consent.

### **CHE 360 Clinical Pharmacology for the Health Professions**

(3-0-3)

Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with the most commonly prescribed drugs, their clinical application, mechanism of action and side effects.

Prerequisite: BIO 233 or BIO 333 or instructor consent.

### **CHE 450 Biochemistry I**

(3-3-4)

Molecular and cellular biochemistry with emphasis on DNA structure, replication, the process and cellular regulation of RNA transcription, and analyzing and constructing DNA.

Prerequisites: BIO 213, CHE 332.

### **CHE 451 Biochemistry II**

(3-3-4)

Molecular biochemistry with emphasis on protein conformation and function, mechanisms of enzyme action and control, and energy production via glycolysis.

Prerequisite: CHE 450.

### **CHE 452 Biochemistry III**

(3-3-4)

Molecular and cellular biochemistry with emphasis on cell membranes, lipid metabolism, aerobic energy metabolism, anabolism and the role of biochemistry in cellular signaling processes.

Prerequisite: CHE 451.

### **CHE 455 Water Quality Technology**

(2-3-3)

Examination of water quality relative to surface, groundwater and industrial sources. Focus on laboratory and field procedures for detection, surveillance and abatement of water pollution.

Prerequisites: ENV 325 and CHE 342, or instructor consent.

### **CHE 465 Fate and Transport of Pollutants**

(3-3-4)

Mass balance. The use of equilibrium and chemical kinetics in the modeling of pollutant transport in water, soil and air. Mixing zone analysis, the use of Darcy's law, flow nets and the Gaussian Plume approximation. Discussion, development and use of selected modeling scenarios.

Prerequisites: CHE 223, MATH 252.

## **(CLS) Clinical Laboratory Science**

### **CLS 100 Introduction to Clinical Laboratory Science**

(1-3-2)

Orientation to the theory and practice of all aspects of the clinical laboratory science profession. The history of clinical laboratory science, professional organizations and career opportunities are discussed.

### **CLS 107, CLS 207, CLS 307, CLS 407 Seminar**

(Hours to be arranged each term.)

### **CLS 412 Pathophysiology**

(2-0-2)

Lecture course reviewing processes that underlie many different disease states and health deviations. The study of the most common disease processes in humans and their correlation with laboratory findings are explored.

### **CLS 415 Clinical Chemistry I**

(6-0-6)

The theory, practical application and technical performance of chemical procedures. Fundamentals of quantitative chemical analysis in the determination of endogenous and exogenous substances in body fluids such as blood, urine, spinal fluid, amniotic fluid and ascites. Emphasis areas will encompass amino acids, proteins, carbohydrates, lipo-proteins, lipids, enzymes, renal and liver functions analytes, GI function related analytes, electrolytes, trace elements, hemoglobin and porphyrins, and hormones, bone metabolism, nutrition, pregnancy and fetal development analytes, and geriatric considerations.

### **CLS 416 Clinical Chemistry II**

(2-0-2)

The theory, practical application and technical performance of chemical procedures.

Fundamentals of quantitative chemical analysis in the determination of endogenous and exogenous substances in body fluids such as blood, urine, spinal fluid, amniotic fluid and ascites. Emphasis areas will encompass therapeutic drug monitoring, toxicology, and method evaluation.

Prerequisite: CLS 415.

### **CLS 420 Clinical Immunology**

(3-3-4)

Lecture/laboratory coverage of human immunity, including innate and adoptive immunity, immune system organs, tissues, and activation, immunoglobulin and complement biochemistry, and test methods used in the clinical lab to assess human immune response in health and in various disease states.

Co-requisite: CLS 432.

### **CLS 422 Molecular Methods**

(1-3-2)

Coverage of molecular techniques used in the clinical laboratory to diagnose disease. Topics covered include principles of molecular biology, nucleic acid isolation, purification, amplification, quantitation, and discrimination. Specimen collection/handling, ethical issues and molecular lab operations are also covered.

Prerequisites: CLS 415, CLS 420, CLS 447.

### **CLS 424 Hemostasis**

(2-3-3)

Lecture and laboratory coverage of the mechanisms of hemostasis and basic pathophysiology of hemostatic disorders. Students perform laboratory procedures pertaining to hemostasis, interpret results and correlate with other laboratory data to identify disease states.

### **CLS 432 Foundations of Clinical Laboratory Science I**

(4-0-4)

The first of two courses covering essential practices of clinical laboratory science. Emphasis on safety, statistical approaches to data evaluation, problem-solving, systems of measurement, troubleshooting, and instrumentation.

### **CLS 442 Hematology I**

(4-6-6)

Lecture and lab coverage of normal development and function of blood cells. Students learn to evaluate normal and abnormal blood cell morphology through microscopic exami-

nation of blood smears. Students perform laboratory procedures pertaining to hematology.

### **CLS 443 Immunohematology I**

(3-3-4)

Lecture and lab coverage of immunohematology with practical application in the contemporary blood bank laboratory. Topics covered include blood groups biochemistry, genetics, and immunology, test methods and transfusion practices including donor selection, component preparation, quality management and compliance issues.

Prerequisites: CLS 420, CLS 424.

### **CLS 444 Microbiology I**

(4-6-6)

Lecture and lab coverage of human bacterial pathogens seen in the clinical laboratory including gram positive and gram negative cocci, gram positive and gram negative bacilli, and anaerobes. Principles and methods of clinical laboratory diagnosis of bacterial diseases are studied.

### **CLS 445 Microbiology II**

(3-3-4)

Lecture and lab coverage of human microbial pathogens seen in the clinical laboratory including spirochetes, mycobacteria, chlamydia, rickettsia, fungi, and viruses. Principles and methods of clinical laboratory diagnosis of diseases caused by these microbes are studied.

### **CLS 446 Microbiology III**

(2-6-4)

Lecture and laboratory coverage of normal and pathogenic parasitic organisms of man with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

### **CLS 447 Practicum: Chemistry**

(0-18-6)

Principles of chemical analysis, quality control, laboratory utilization, and safety. Hands-on exercises, demonstrations, and computer tutorials illustrating chemical analysis and data evaluation in a clinical chemistry laboratory. Discussion of case studies using problem-solving methods to analyze and interpret relevant chemical analysis data.

Corequisite: CLS 415.

### **CLS 448 Infectious Serology**

(0-3-1)

Clinical laboratory diagnosis of infectious disease by serological test methods is studied. Prerequisites: CLS 420, CLS 432.

### **CLS 449 Practicum: Urinalysis**

(1-3-2)

Study of urine with emphasis on urinalysis techniques, renal function, physical examination, chemical examination, microscopic examination, renal disease, and metabolic disorders. Methods include microscopy, discussion, case histories, computer tutorials, hands-on exercises, demonstrations, problem solving, and interpretation of results.

### **CLS 452 Hematology II**

(4-3-5)

Comprehensive study of the pathophysiology of hematological disorders. Students perform microscopic examination of blood films, interpret results and correlate with other laboratory data to identify disease states.

Prerequisite: CLS 442.

### **CLS 453 Immunohematology II**

(1-3-2)

Continued study of immunohematology emphasizing clinical decision-making and problem-solving related to blood banking and transfusion therapy practices.

Prerequisite: CLS 443.

### **CLS 457 Practicum: Advanced Chemistry/Immunology Techniques**

(2-0-2)

Directed study, review, and demonstration of advanced methods and instruments in use in clinical or research laboratories. These may include, but not be limited to tissue typing, molecular methods, automated systems, flow cytometry, and chromatographic methods.

Prerequisites: CLS 447.

Co-requisite: CLS 448.

### **CLS 462 Foundations of Clinical Laboratory Science II**

(1-3-2)

The second of two courses covering essential practices of clinical laboratory science. Emphasis on specimen collection, quality assurance, principles and application of ethics, professionalism, lab management, education techniques, and research.

Prerequisite: CLS 432.

### **CLS 470 Chemistry and Immunology Externship**

(0-12-4)

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical chemistry/immunology laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

### **CLS 471 Hematology Externship**

(0-12-4)

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical hematology laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

### **CLS 472 Microbiology Externship**

(0-12-4)

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical Microbiology laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

### **CLS 473 Immunohematology Externship**

(0-12-4)

Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary blood bank laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.



## (COM) Communication

### COM 104 Introduction to Communication

(3-0-3)

Introduces Communication Studies. Principles and applications developed in context of career exploration, interpersonal, group, organizational and technical communication. Includes history and structure of communication field, career paths, research skills and role of technology. Required for majors.

### COM 105 Introduction to Communication Theory

(3-0-3)

Introduces basic theories and concepts in the Communication discipline. Acquaints students with major theories fundamental to communication research and to communication interactions including interpersonal, organizational, media and intercultural.

Prerequisite: COM 104.

Pre- or corequisite: WRI 122.

### COM 106 Introduction to Communication Research

(3-0-3)

Introduces research in the communication discipline. Students find and analyze quantitative, qualitative and critical research. Introduces communication research as a process composed of methods, data-gathering, analysis, conclusions.

Prerequisite: COM 105.

### COM 107, COM 207, COM 307, COM 407 Seminar

(Hours to be arranged each term.)

### COM 115 Introduction to Mass Communication

(3-0-3)

Provides an introduction to mass media. Focuses on understanding how media operate with emphasis on contemporary social, economic, political, cultural and ethical issues.

### COM 205 Intercultural Communication

(3-0-3) C

Introduces basic theories and concepts of intercultural communication. Builds understanding and skills enabling students to analyze intercultural interactions and develop and practice effective communication strategies.

### COM 215 Creativity in Communication

(3-0-3)

Define and learn how personal and group creativity can be enhanced. Study the lives of creative individuals in the arts, sciences, and industry. Individual and group exercises designed to enhance the creative process.

### COM 216 Essentials of Grammar and Punctuation

(3-0-3)

Involves learning basic and advanced grammar and punctuation to provide a firm foundation for any type of writing.

Prerequisite: WRI 121 with grade "C" or better.

### COM 225 Interpersonal Communication

(3-0-3) C

Introduces interpersonal communication theory and practice. Students apply course concepts to analyze and practice dyadic communication to develop more effective work and personal relationships.

### COM 226 Nonverbal Communication

(3-0-3)

Nonlinguistic aspects of human communication. Examines the relationships between nonverbal and verbal communication behavior and nonverbal communication skill. Topics include space, distance, environment, touch, gesture, facial expression and gaze as communication.

Prerequisites: COM 225, SPE 111.

### COM 237 Introduction to Visual Communication

(3-0-3)

Introduces theory and rhetoric through several perspectives: personal, historical, technical, ethical, cultural, and critical. Emphasizes relationships between form/content, word/image, and societal role of visual communication.

Prerequisite: WRI 122.

### COM 248 Digital Media Production

(2-3-3)

Study of the technical aspects of digital media design and production. Hands-on experience in creating and editing video and audio. Production of video and audio for specific contexts.

### COM 255 Communication Ethics

(3-0-3)

Examines typical communication situations involving ethics. Provides methodologies for critically evaluating ethical situations. Uses case approach with emphasis on application. Prerequisite: WRI 122.

### COM 256 Public Relations

(3-0-3)

Introduces history and practice of public relations; emphasizes practical accomplishment of public relations campaigns. Topics: internal/external audiences, brochures, press releases, internal documents, pitches, issue management, and project design, execution. Service learning course.

Prerequisite: WRI 122.

### COM 276 Democracy and Media

(3-0-3)

Provides introduction to ownership/structure of media, politics, objectives, and links to the corporate and national economy. Introduces project analysis through ownership, sourcing, flak, advertising, ideology filters.

Prerequisites: COM 115, WRI 122.

### COM 301 Rhetorical Theory and Application

(3-0-3)

Introduces rhetorical theories and applications to personal, business and industrial settings. Focuses on evolution of rhetoric. Examines rhetorical effects on individual, group and mass communication.

Prerequisites: SPE 111, WRI 227.

### COM 320 Advanced Intercultural Communication

(3-0-3) C

Builds on theories from COM 205. Focuses on analyzing intercultural interactions in specific work contexts, for example health care, education, social services, business and technology.

Prerequisite: COM 205.

### COM 326 Communication Research

(3-0-3)

Introduction to research methods and design. Design of both quantitative and qualitative research. Emphasis on communication based methodologies: focus groups, directed interviews, and ethnomethodologies. Includes a research project and written and oral research reports.

Pre- or corequisite: WRI 227.

**COM 345 Organizational Communication I**

(3-0-3)

Studies communication in organizations, including message movement, exchange and interpretation, identification of variables, roles and patterns influencing communication in organizations.

**COM 346 Health Communication**

(3-0-3)

Overview of interpersonal, social and cultural issues in health communication, including family interaction, roles of patients and caregivers, communication in health organizations and the role of media.

Prerequisites: WRI 122 with "C" or better; COM 205 or equivalent.

**COM 347 Negotiation and Conflict Resolution**

(3-0-3) C

Examines theories and strategies for conduct of conflict and negotiation across contexts.

Topics: destructive conflict cycles, confronting/managing conflict, social/psychological aspects, conflict analysis, causes and promoting constructive conflict.

Prerequisite: SPE 321 or instructor consent.

**COM 348 Facilitation**

(3-0-3)

Provides experience leading small groups through deliberative processes including participatory decision making and conflict resolution. Provides theoretical and practical understanding of facilitation focusing on building skills in group leadership.

Prerequisite: SPE 321.

**COM 358 Communication and the Law**

(3-0-3)

Issues involved in establishing legal parameters within which professional communicators work. Evolving interpretations of the first amendment, balancing conflicting first amendment claims, libel, limits of a free press, prior restraint, licensing and regulation.

Prerequisites: SPE 111, WRI 227.

**COM 365 Electronic Communication and Society**

(3-0-3)

Explores the Internet as a mediator of human communication and its effect on society.

Topics include social media, informatics, entertainment/workplace contexts, and the

convergence of technology as a global village.

Prerequisite: WRI 227.

**COM 401/CIV 401 Civil Engineering Project I**

(4-6-6) C

First term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive three credit hours in civil engineering design (CIV 401) and three credit hours in communication for general education (COM 401). Students will be introduced to a major civil engineering project, prepare a professional engineering proposal and function effectively in engineering design teams. Formal written proposal and oral presentation of the proposal are required.

Prerequisite: Civil Engineering advisor consent.

**COM 402/CIV 402 Civil Engineering Project II**

(4-6-6) C

Second term of a two-term sequence.

Students receive three credit hours in civil engineering design (CIV 402) and three credit hours in communication for general education (COM 402). Student teams will perform work as defined in the fall term proposal. Consultations with faculty, students and clients ensure work progresses toward stated goals. Term culminates with final design recommendations presented in a written report and oral presentation. Plans and specifications and a construction cost estimate will also be completed.

Prerequisite: COM 401/CIV 401 both with grade "C" or better.

**COM 415 Developing Effective Multimedia-based Presentations**

(3-0-3)

Interdisciplinary course introducing students to the tools and skills associated with designing, developing, presenting and disseminating state-of-the-art multimedia presentations. Hands-on experience with graphics, digital/audio video, animation and text.

Prerequisites: CST 101 or equivalent, SPE 111 and WRI 227.

**COM 420 Externship**

(Variable to a total of 15 credits)

Students work in applied settings in their emphasis under the supervision of an on-site mentor. Regular contact with extern advisor. Written externship reports required.

Prerequisite: Senior standing.

**COM 421 Senior Project I**

(3-0-3)

Allows students to initiate research on a significant capstone project in the communication field. Focuses on development of a proposal and presentation.

Prerequisite: Senior standing.

**COM 422 Senior Project II**

(3-0-3)

Continues work of COM 421, focusing on project research methodologies.

Prerequisite: COM 421.

**COM 423 Senior Project III**

(3-0-3)

Focuses on completion of project, including final documentation and presentation.

Prerequisite: COM 422.

**COM 425 Mediation**

(3-0-3)

Prepares students to mediate in public and private settings. Covers conflict management strategies, processes and issues including gender and cultural awareness.

Prerequisite: COM 225 or instructor consent.

**COM 426 Mediation Practicum**

(Variable Credit 1-3)

Mediation practice and observation with experienced mediators through the Klamath Mediation Center. Students will progress from observation, to co-mediation, and finally, mediation of real disputes. Builds on the theoretical insights and practice of COM 425.

Co- or prerequisite: COM 425.

**COM 437 Communication Training and Development**

(3-0-3)

Prepares students to facilitate communication skills workshops and differentiate between organizational structure and communication training needs. Topics include audience analysis, learning theory, curriculum design, presentation skills, classroom dynamics and assessment.

Prerequisite: SPE 321.

**COM 445 Organizational Communication II**

(3-0-3)

Examines organizational communication systems and the design of communication audit procedures. Synoptic reports of findings

and recommendations.

Prerequisite: COM 345 or instructor consent.

### **COM 446 Communication and Leadership**

(3-0-3)

Explores the relationship between communication and leadership within organizations and the development and application of communication competencies associated with effective leadership.

Prerequisite: SPE 321 or instructor permission.

## **(CST) Computer Systems Engineering Technology**

### **CST 101 Introduction to Personal Computing**

(3-3-4)

Computer concepts, terms and trends related to personal computers (microcomputers). Introduction to Windows/NT and other commonly used Windows application programs. Hands-on labs provide experience with applications, networks and the Internet using e-mail and the World Wide Web.

### **CST 102 Introduction to Computer Systems**

(2-3-3)

Concepts, terms, and trends related to the computer engineering technology (hardware) and software engineering technology (software) curriculums. Includes discussions on fundamental aspects of the computer field. Laboratory component will introduce students to micro-computers, programming concepts and various computer/engineering related software.

Prerequisite: CSET major or instructor consent.

### **CST 103, CST 104, CST 105 Introduction to Computer Systems I, II, III**

(1-3-2) (0-3-1) (0-3-1)

Concepts, terms and trends related to computer engineering technology (hardware) and software engineering technology (software) curriculum. Includes discussions on fundamental aspects of the computer field. Laboratory component will introduce students to microcomputers, programming concepts and various computer engineering related software.

### **CST 107, CST 207, CST 307, CST 407 Seminar**

(Hours to be arranged each term.)

### **CST 116 C++ Programming I**

(3-3-4)

Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed MIS 116. Pre- or corequisite: MATH 111.

### **CST 123 Topics in Computer Science**

(3-0-3)

Overview of various software engineering subject areas. Topics include computer history, operating systems, networking, software engineering, databases, software careers, and various application areas. Also examines ethical and social issues raised by widespread use of computers.

Prerequisite: CST 126 with grade "C" or better.

### **CST 126 C++ Programming II**

(3-3-4)

Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed MIS 126.

Prerequisite: CST 116, with grade "C" or better.

### **CST 130 Computer Organization**

(3-0-3)

Introduces computer elements, organization, and instruction sets, computer arithmetic, ALU, Registers, Datapath, memory and Control unit functions.

Prerequisite: CST 162 with grade "C" or better.

### **CST 131 Computer Architecture**

(3-0-3)

Continuation of CST 130. Topics include main memory, cache, virtual memory, memory management, secondary storage, networks, operating system functions, and pipelining. Prerequisite: CST 130 with grade "C" or better.

### **CST 133 Digital Electronics II – Sequential Logic with HDL**

(3-3-4)

Introduction to Sequential Logic, Latches, Flip/Flops, Timers, Counters/Registers, HDL Implementation, PLD HW Implementation, Finite State Machine Design/Analysis, Logic Testing, MPU System, Memory Devices, DC Parameters and Timing Analysis. Laboratory integral to the class. Students must register for a laboratory section.

Prerequisite: EE 131 or CST 162, both with grade "C" or better.

Corequisite: CST 134.

### **CST 134 Instrumentation**

(0-3-1)

Lecture/laboratory course that provides students experience in measuring, calibrating, and testing digital and analog systems. Uses various test equipment for test and measurement of digital and analog components.

Corequisite: CST 133.

### **CST 136 Object-Oriented Programming with C++**

(3-3-4)

A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed MIS 136. Prerequisite: CST 126, with grade "C" or better.

### **CST 141 Computer Programming (FORTRAN)**

(3-3-4)

Computer concepts and problem solving methods using the FORTRAN programming language. Topics include: algorithms, simple data types, conditional and iterative structures, subprograms, structured programming and documentation.

Prerequisite: MATH 111.

### **CST 162 Introduction to Digital Logic**

(3-3-4)

Introduction to combinational logic. Includes introduction to DC circuits, number systems, Boolean algebra, logic gates, Muxes, Decoders, Adders, Subtractors. Logic design using a hardware description language. Laboratory

integral to the class.  
Pre- or corequisite: MATH 100.

### **CST 204 Introduction to Microcontrollers**

(3-3-4)

An introduction to microcontrollers (uC). Signals and data flow within simple systems. Introduction to instruction set, software development tools and I/O techniques, both programmed and interrupt-driven. Experiments using uC plus external circuits in applications.

Prerequisites: CST 131, CST 250, each with grade "C" or better, or instructor consent.

### **CST 211 Data Structures**

(3-3-4)

Discussion of efficient methods of data representation such as stacks, queues, linked-lists, binary trees, B-trees. Emphasis is on data representation and algorithm analysis.

Prerequisite: CST 136 with grade "C" or better.

### **CST 223 Concepts of Programming Languages**

(2-3-3)

Study of principles and fundamental concepts characterizing high-level programming languages, including history and survey of programming paradigms, syntax and semantic rules, data types, control flow and data abstraction.

Prerequisite: CST 126 with grade "C" or better.

### **CST 229 Introduction to Grammars**

(3-0-3)

The concepts involving alphabet words and languages will be discussed. Related topics in automata and regular expression will be explored. Emphasis is on context free grammars, parse tree and parsing techniques.

Prerequisites: CST 211, and CST 223 or CST 231.

### **CST 231 Computer Design with Programmable Logic**

(3-0-3)

This class introduces students to structured digital design techniques using programmable logic devices. The course investigates concepts, terminology and techniques used to design and implement programmable logic devices. Both software tools (synthesis tools) and programmable hardware applications will be provided to demonstrate the capabilities of programmable devices.

Prerequisite: CST 133 with grade "C" or better.

Corequisite: CST 232.

### **CST 232 Computer Design with Programmable Logic Laboratory**

(0-3-1)

Laboratory experiments to support CST 231. Experiments with programmable logic devices including simulation.

Prerequisite: CST 133 with grade "C" or better.

Corequisite: CST 231.

### **CST 236 Software Systems Testing**

(3-3-4)

Focus on software testing and reliably monitoring the health of software development. Topics include test driven development, story driven tests, unit tests, Web tests, load tests, static code analysis and dynamic code analysis.

Prerequisite: CST 136 with grade "C" or better.

### **CST 238 Graphical User Interface Programming**

(3-3-4)

Introduction to Windows based programming. Topics covered include a review of the standard user interface elements of Windows, the Windows Application Program Interface (API), message processing, writing Windows Procedures, working with text, using Windows resources, creating modal and modeless dialog boxes, and using the Graphics Device Interface.

Prerequisites: CST 211 with grade "C" or better and SPE 111.

### **CST 240 UNIX**

(2-3-3)

Students will study the structure of the UNIX/ Linux Operating System, including: file structure, input/output processing, commands and utilities, shell configuration, communications, and script programming languages. Emphasis will be placed on lab work done within the UNIX/Linux environment.

Prerequisite: CST 126 with grade "C" or better.

### **CST 250 Computer Assembly Language**

(3-3-4)

Concepts of assembly language programming applied to a modern computer; data and instruction formats, address generation; data

definition, storage allocation and program control statements; sub-routine library; CPU instruction set; control records; and writing of sub-routines.

Prerequisites: CST 126 and CST 130 with grade "C" or better.

### **CST 260 Advanced Assembly Language Programming**

(3-3-4)

Advanced applications of assembly language programming such as: interrupt handling, writing drivers involving bus interface devices, graphic applications, and interfacing with high level languages. Software projects will be developed on Intel 80XXX family of processors.

Prerequisite: CST 250, with grade "C" or better, or instructor consent.

### **CST 262 Digital Design Using HDL**

(3-3-4)

Advanced digital circuit design. HDL is used in designing sequential logic circuits such as registers, counters, and synchronous finite state machines. Basic digital circuit design and analysis with semiconductor devices is also covered. Laboratory is integral to the class.

Prerequisites: CST 162 with grade "C" or better, EET 101, EET 102.

### **CST 276 Software Design Patterns**

(3-3-4)

Design patterns establish a common terminology allowing developers to use a common vocabulary and share a common viewpoint of the problem. Design patterns provide a common point of reference during the analysis and design phase of a project.

Prerequisite: CST 136 with grade "C" or better.

### **CST 295 Individual Studies**

(Hours to be arranged each term.)

### **CST 298 Reading and Conference**

(Hours to be arranged each term.)

### **CST 299 Laboratory Practice**

(Hours to be arranged each term.)

### **CST 311 Advanced Data Structures and Algorithm Analysis**

(3-1-3)

Discussion and implementation of advanced data structures like K-way trees and sets. Analysis techniques of computer algorithms with respect to their time and space complex-

ity. Emphasis will be placed on implementation of algorithms and analyzing their performance in various environments.  
Prerequisite: CST 211.

### **CST 313 Computer Software Techniques**

(3-0-3)

Lectures are divided between data structures and operating systems. Data structures section involves data representation, B-trees, graphs, and files. Operating systems section involves process, memory, and file management as related to UNIX. Cannot be taken for graduation credit if student has completed MIS 315.

Prerequisite: CST 126 with grade "C" or better.

### **CST 315 Embedded Sensor Interfacing and I/O**

(3-3-4)

Introduction to Data Acquisition Systems. Sampling Theory, ADC, DAC, Signal Conditioning, Filters, Amplifiers, Noise. Transducers and sensors, including Bio-sensors. Sensor Interfacing, Smart Sensors, and Busses. Lab integral to course.

Prerequisites: CST 204; EE 223, or EET 237 and EET 238.

### **CST 316 Software Process Management**

(3-3-4)

In this first term of a three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.

Prerequisite: CST 211 with grade "C" or better.

### **CST 320 Compiler Methods**

(3-3-4)

Basic concepts of compiler design and operation. Topics include lexical and syntactical analysis, parsing, translation, data flow analysis and code generation, and implementation of a small compiler.

Prerequisite: CST 229.

### **CST 321 Introduction to Microprocessors**

(3-6-5)

Hardware and assembly level software

needed to interface a microprocessor to I/O ports, memory and interrupt sources. Topics include bus controller design, timing analysis, programmed I/O and interrupts. Extensive lab provides experience with system design, test and debugging using the 80386DX microprocessor.

Prerequisites: CST 204 and CST 231, with grade "C" or better, or instructor consent.

### **CST 324 Database Systems and Design**

(3-3-4)

An overview of Data Base Management Systems including requirements analysis methodology for data base design, conceptual DB design methodology including formulation of entity-relationship models, review of query language characteristics, and a comparison of commonly available DBMS.

Prerequisite: CST 211 with grade "C" or better.

### **CST 326, CST 336 Software Design and Implementation I, II**

(3-3-4)

In this second and third terms of a three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.

Prerequisites: CST 326: CST 276, CST 316 both with grade "C" or better; CST 238, CST 324.

Prerequisites: CST 336: CST 236, CST 326 both with grade "C" or better.

### **CST 328 Computer Graphics**

(2-3-3)

Advanced algorithms and techniques are presented, including: 3-D modeling and rendering, perspective projection, hidden line/surface removal, curve/surface modeling and various lighting models. The OpenGL library will be used extensively.

Prerequisite: CST 238 or instructor consent.

### **CST 331 Microprocessor Peripheral Interfacing**

(3-6-5)

Expansion of processor based systems through off chip parallel bus interfacing. Adding off chip I/O ports, memory and parallel I/O devices. I/O port expansion through serial interface. In depth interface timing

analysis. Extensive lab provides continued experience with system design, test and debugging techniques.

Prerequisite: CST 337 or CST 321; CST 231 with grade "C" or better.

### **CST 334 Project Proposal**

(1-0-1)

Description of senior project; time management techniques; task assignment; development of in-depth senior project proposal and preparation of formal senior project. Includes use of PC-based planning.

Corequisite: CST 336 or CST 373.

### **CST 335 I/O Device Interfacing Techniques**

(3-3-4)

Application of opto-couplers, peripheral drivers, A-D converters, and operational amplifiers to microprocessor/microcontroller based applications. Survey of transducer theory and available devices. An embedded system is used as a development platform in laboratory experiments.

Prerequisites: CST 204; EE 223, or EET 237 and 238 or instructor consent.

### **CST 337 Embedded System Architecture**

(3-6-5)

Configuration, programming, testing, debugging of embedded systems. Serial interfaces including RS232, I2C and SPI. I/O methods including programmed I/O, interrupts and DMA. Interfacing issues related to timing and protocol. Impact of processor architecture and I/O methods on system performance.

Prerequisite: CST 204 with grade "C" or better.

### **CST 338 Computer Modeling and Simulation**

(3-0-3)

Modeling and simulation of discrete and continuous systems. Discrete time and discrete event simulation models will be discussed and developed. Formal model development and model evaluation will be discussed.

Prerequisites: CST 126, CST 211, MATH 465.

### **CST 340 Advanced UNIX**

(3-0-3)

Advanced facets of the UNIX operating system will be explored. Topics of study will include: interprocess communication, pro-

gramming, system administration. Students will use Oregon Tech computers operating under UNIX.

Prerequisite: CST 240.

### **CST 344 Intermediate Computer Architecture**

(3-0-3)

Register level design of a computer system, including the processor and memory structures. Cache and virtual memory. Includes analysis of both CISC (Complex Instruction Set Computer) and RISC (Reduced Instruction Set Computer) architectures.

Prerequisite: CST 204.

### **CST 345 Hardware/Software Co-Design**

(3-3-4)

Co-design of hardware and software systems. Methods used in the development of embedded systems consisting of tightly coupled hardware and software components.

Prerequisites: CST 204 and CST 211 with grade "C" or better.

### **CST 346 .NET Programming in C#**

(2-3-3)

Essentials of programming using the C# language. It emphasizes C# programming structure, syntax, design, and implementation essentials, as well as a brief overview of the .NET framework. Creating Windows Forms and accessing ADO.NET are also examined.

Prerequisite: CST 211 or CST 313.

### **CST 347 Real-Time Embedded Operating Systems**

(3-3-4)

OS Kernel Constructs and Problem Scaling, Small Scale Environment Specification, Process, Threads, Fibers, Synchronization Primitives, Small Scale Memory Management, Scheduling Paradigms, Real-Time Scheduling, I/O and Debugging. Lab integral to course.

Prerequisites: CST 211, CST 240, both with grade "C" or better.

### **CST 350 Introduction to VLSI Design**

(2-3-3)

An introduction to the various aspects of Very Large Scale Integration circuits. Includes modern design techniques using CAD/CAE software tools, Design using Standard Cell techniques, discussion of full custom design and VLSI testing concepts. Demonstrations are included to supplement lectures. The course will include laboratory experience.

Prerequisites: CST 231, CST 232, EE 321 or instructor consent.

### **CST 351 Advanced PLD Circuits**

(2-3-3)

Study of complex PLDs (CPLDs) and other more advanced PLD architectures and related applications. Laboratory includes design capture, synthesis, placement and routing tools to implement several designs.

Prerequisites: CST 231, CST 232.

### **CST 352 Operating Systems**

(3-3-4)

Issues in Operating Systems Design. Topics include: processes, threads and fibers, privilege modes, preemptive multitasking, process state machine, scheduling paradigms, system calls/ traps, shared resources and synchronization primitives, memory management schemes/virtual memory, deadlock detection, handling, and avoidance, I/O management.

Prerequisites: CST 211, CST 240 both with grade "C" or better.

### **CST 356 Web Design and Development**

(2-3-3)

Basic components of Web development which include aspects of design as well as current development technologies. Development technologies include, but are not limited to, HTML/XHTML, JavaScript, and CSS. Other technologies discussed may include Java Applets, CGI programming, ASP.NET and PHP.

Prerequisite: CST 211 or CST 313.

### **CST 371, CST 372, CST 373 Embedded Systems Development I, II, III**

371 (3-3-4), 372 (2-3-3), 373 (1-3-2)

A three-term sequence covering design, implementation, test and documentation techniques used for embedded computer systems. Each student is required to work on and complete a project as a member of a team. The entire sequence must be completed in three consecutive terms.

Prerequisite: CST 204 for CST 371, CST 371 for CST 372, CST 372 for CST 373. Corequisite: CST 315 or CST 335 for CST 371.

### **CST 390, CST 490 Co-op Field Practice**

(Variable Credit)

An approved work program related to the student's field of specialization for a continu-

ous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's engineering technology department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence.

### **CST 405 Directed Study**

(3-0-3)

Advanced study under the guidance of faculty. Topics and learning objectives arranged between students and instructor.

Students will meet with instructor weekly to discuss progress and provide evidence of their performance.

Prerequisite: Junior standing in CSET and instructor consent.

### **CST 408 Workshop**

(Hours to be arranged each term.)

### **CST 412, CST 422, CST 432 Senior Development Project**

412 and 422 (2-5-3), 432 (1-3-2)

A three-term sequence giving the student major responsibility for planning and carrying out a computer-oriented project. Individual creativity will be encouraged by allowing the student to select an appropriate project.

Prerequisite: CST 334; CST 336 or CST 373.

### **CST 415 Computer Networks**

(3-3-4)

Current issues in computer networks and distributed systems. Topics include network protocols, interface standards, and transmissions mode. Network layers detailing Internet Protocol Suite and correlations with 7 layer abstract communication model. Routing and WAN Architectures.

Prerequisite: CST 336 or CST 373 with grade "C" or better.

### **CST 417 Embedded Networking**

(3-3-4)

Network Protocol in a Small Scale embedded environment, Physical characteristic specification, Network Interface Controller interface, TCP/IP, Application interface, Packet Routing, Network Architecture. Lab integral to course.

Prerequisite: CST 373.

**CST 418 Data Communications and Networks**

(3-0-3)

Provides students with an introduction to data communications and computer networks. Students acquire knowledge of communications components and their use in implementing a network. Emphasis is on the practical aspects of network configuration, operations, and detection, isolation and correction of problems.

Prerequisites: CST 204; EET 237 or EE 223.

**CST 420 Effective C++ and STL**

(2-3-3)

Emphasis is on techniques to apply the C++ language and library effectively toward the implementation of object-oriented systems. Specific ways to improve design and program will be covered as well as purpose and use of the C++ Standard Library.

Prerequisite: CST 320 or instructor consent.

**CST 423 Advanced Business Systems Programming**

(3-0-3)

Emphasis is on structured analysis, design and programming, interactive programming, use of utilities/libraries, and integration of a high level language with a DBMS.

Prerequisite: Junior standing in CSET.

**CST 425 Advanced Networks and Telecommunications**

(3-0-3)

Detailed analysis of communications networks, including telephony, wide area, and local area implementations. Emphasis will be placed on the design and management of complex networks. Opportunity will be provided to work with existing networks.

Prerequisite: CST 415.

**CST 426 Introduction to Artificial Intelligence**

(3-0-3)

Concepts and techniques of AI with considerable use of the LISP interpreter. Includes discussion of "search" methods, knowledge representation, natural language processing, models of cognition, vision, and "The Blocks World."

**CST 435 Microprogramming**

(3-0-3)

The concepts and methods involved in programming the computer's control unit. Coverage includes a review of computer or-

ganization, microprogram operations such as floating point arithmetic, translator/simulator development, and emulation techniques.

Prerequisite: Software Engineering Technology senior standing, or instructor consent.

**CST 436 Robotics**

(3-0-3)

Robot models in the abstract and as practical laboratory problems. Models will be constructed using LISP and the student will be encouraged to design and build at least "an arm and hand" in the "Blocks World" as a laboratory assignment. Additional studies of applications-oriented AI research in other fields such as chemistry, medicine, and education.

**CST 440 Seminars in Information Systems**

(3-0-3)

Advanced studies in areas related to current developments and trends in computer systems. Topics include examining emerging technologies, ethics, security, privacy, productivity improvement methodologies and tools, computer system reviews and audits, and professional development.

Prerequisite: Senior standing in CSET.

**CST 441 Logic Synthesis with VHDL**

(2-3-3)

This course will show students how to use the hardware description language, VHDL, with hierarchical design techniques to manage a complex design. In this process, students will create a design using the VHDL modeling tools, simulate the design using advanced simulation techniques, synthesize and test the design. Laboratory integral with the course.

Prerequisite: CST 351 or instructor consent.

**CST 442 Advanced Computer Architecture**

(3-0-3)

Advanced concepts in computer architectures including pipelined, superpipelined, superscalar, and dynamically pipelined processor architectures, Parallel processors, Multiprocessors, Cache and Cache coherency.

Prerequisite: CST 344 or instructor consent.

**CST 445 Advanced Microprocessors and Applications**

(3-3-4)

This class examines the architecture of the Motorola 680X0 microprocessor family. The course investigates advanced design techniques used in developing interfaces to the

680X0 microprocessor family, along with the use of coprocessors and special device controllers. Advanced design concepts in both software and hardware will be examined.

Prerequisite: CST 331 or instructor consent.

**CST 451 ASIC Design using FPGAs**

(3-3-4)

FPGA senior project design specifications; presentation of the project in a design review to peers; application of formal hardware/software design techniques when designing with FPGAs; and verification of FPGAs.

Prerequisite: CST 441 or instructor consent.

**CST 455 System On a Chip Design**

(3-3-4)

System level design representations and modeling languages. Target architecture models. Intra-chip communication. Partitioning algorithms. Task time measurement. Back annotation of timing. Synthesis of SoC components.

Prerequisites: CST 345, CST 373.

**CST 456 Embedded System Testing**

(3-3-4)

Testing ICs, MPU/Memory, IP Core, SoC and mixed signal hardware. Fault Models, Hardware testing methods --Scan Design, Test Pattern Generation, Built in self test. Software Regression Testing, Performance, Real-time Failure, Code Coverage, Monitors, Fault Injection, Executable Model Testing.

Prerequisites: CST 136, CST 204, CST 231.

**CST 461 Advanced Topics in VLSI Design**

(2-3-3)

Conclusion of a three-course sequence in Very Large Scale Integration design. This course focuses on testing methodology, especially boundary scan. In addition, an alternative synthesis tool is introduced. Current issues in VLSI design are discussed. Laboratory experiments form an essential part of the course.

Prerequisite: CST 441.

**CST 462 Real-Time Operating Systems**

(2-3-3)

Topics in real-time operating systems analysis and design. Hard versus soft real-time systems. Scheduling paradigms and algorithms. Analysis of systems and processes. Real-time system modeling and time prediction. Prerequisite: CST 352 with grade "C" or better.

**CST 464 RISC-Based  
Microprocessor Systems**

(3-3-4)

RISC architecture and applications. Includes i960 microprocessor features, instruction set, and i960 support software. Laboratory focus on applications.

Prerequisites: CST 331, CST 344.

**CST 465 Web Development with  
ASP.NET**

(2-3-3)

Dynamic Web site creation and development strategies using ASP.NET are discussed and practiced. Focus on the importance of databases in the creation of a dynamic Web site is heavily emphasized.

Pre- or corequisites: CST 324 and CST 365 or instructor consent.

**CST 466 Embedded System Security**

(3-0-3)

Fundamental theories and applications of cryptography relevant to computer and embedded system security.

Prerequisites: CST 126, MATH 112.

**(DH) Dental Hygiene****DH 100 Introduction to Dental  
Hygiene**

(1-3-2)

Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed. Hands-on activities involving basic dental hygiene skills. Opportunities to experience normal oral anatomy.

**DH 101 Introduction to Dental  
Hygiene II**

(0-3-1)

Hands-on activities involving the procedures and skills learned in DH 100. Students will practice basic dental hygiene skills. Opportunities to experience normal oral anatomy.

Prerequisite: DH 100.

**DH 107, DH 207, DH 307, DH 407  
Seminar**

(Hours to be arranged each term.)

Review, discussion, evaluation, and problem solving of the students' clinical experience.

**DH 221, DH 222, DH 223 Dental  
Hygiene Clinical Practice and  
Seminar I, II, III**

(221-F)(2-6-4)(222-W)(2-6-4)(223-S)(1-6-3)

Sequential courses designed to provide clinical skills essential for the practice of dental hygiene. Skill development of patient appraisal, basic instrumentation, and individualized preventive care emphasized. Special emphasis on children up to 12 years old.

Prerequisite: For DH 221—Admission to Dental Hygiene Program.

Prerequisite: For DH 222—DH 221.

Prerequisite: For DH 223—DH 222 and CHE 360.

**DH 225 Head and Neck Anatomy,  
Histology and Embryology**

(2-3-3)

Anatomy of head and neck integrated with histology and embryology of head neck structures, and oral and dental tissues.

**DH 240 Prevention I**

(3-0-3)

Cariology, remineralization, fluorides, xerostomia, oral physiotherapy aids, plaque and calculus. Begin discussions about healthcare for the provider as a part of holistic healthcare.

Prerequisite: Admission to the Dental Hygiene Program.

Corequisite: DH 221.

**DH 241 Prevention II**

(3-0-3)

Psychological theories pertaining to patient care, including motivational interviewing and patient communication techniques. Healthcare for the provider is continued to include but not be limited to computerized dietary analysis and dietary counseling techniques and wellness goals for the provider.

Prerequisite: DH 240.

**DH 242 Prevention III**

(3-0-3)

Preventive needs of infants through sixth grade. Sealants, early childhood caries, occlusion and nutrition, and management of this age group are considered. Healthcare for the provider is continued.

Prerequisite: DH 241.

**DH 244 General and Oral Pathology**

(3-0-3)

Introduction to general pathology and common oral pathologies. Basic pathol-

ogy, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

**DH 252 Oral Radiology I**

(2-3-3)

Theoretical background and practical application of dental radiography. Exposure techniques, processing, mounting, and evaluation of dental radiographs; physical principles of production; clinical use of X-radiation; and radiation safety procedures.

**DH 253 Oral Radiology II**

(2-0-2)

Specialized techniques for children, special needs patients, extra-oral procedures, occlusal projections, localization techniques, radiographic detection and interpretation of potential pathology.

Prerequisite: DH 244.

**DH 254 Introduction to  
Periodontology**

(1-0-1)

Introduction to periodontology with emphasis on etiology and pathogenesis of periodontal disease, disease classification, and assessment procedures.

Prerequisite: DH 244.

**DH 267 Emergency Procedures**

(2-1-3)

Prevention, preparation, and management of emergency situations common in the dental environment. Individual and team practice in carrying out emergency procedures.

Prerequisite: DH 244.

**DH 275 Dental Ethics**

(2-0-2)

Professional ethics and legal requirements of the dental profession.

**DH 299 Laboratory Practice**

(Hours to be arranged each term.)

**DH 321, DH 322, DH 323 Dental  
Hygiene Clinical Practice and  
Seminar IV, V, VI**

(321-F)(2-6-4)(322-W)(1-6-3)(323-S)(1-12-5)

Continued development of dental hygiene skills, ultrasonic and advanced instrumentation, expanded functions and observation in



specialty practices.

Prerequisite: For DH 321–DH 223.

Prerequisite: For DH 322–DH 321.

Prerequisite: For DH 323–DH 322.

### **DH 340 Prevention IV**

(3-0-3)

Recognition and promotion of positive oral health habits for adolescents. Eating disorders, orthodontics, tobacco cessation, and drug/alcohol concerns and their effect on the oral cavity. Sports guard use and fabrication. Mental and physical healthcare for the provider.

Prerequisite: DH 242.

### **DH 341 Prevention V**

(3-0-3)

Dental care for oral cancer patients. Examination of different antimicrobials and their use. The needs of geriatric patients and special needs patients. Healthcare for the provider. Prerequisite: DH 340.

### **DH 344 Advanced General and Oral Pathology**

(3-0-3)

Further study of general and oral pathology. Developmental, hereditary, and congenital disorders. Endocrine, cardiovascular, hematopoietic, respiratory, gastrointestinal, neurological, and skeletal disorders. Tooth abnormalities, radiographic lesions, and oral tissue enlargements. Systemic and oral complications of HIV and AIDS. Lesion description emphasized.

Prerequisite: DH 244.

### **DH 351 Pain Management I**

(1-3-2)

Coordinated lecture and laboratory practice in the techniques of local anesthesia. Factors in selection of local anesthetic.

Prerequisite: CHE 360 and DH 267.

### **DH 352 Pain Management II**

(2-3-3)

Recognition of dental anxiety; behavioral management; nitrous oxide sedation techniques are practiced. Health history evaluation and case analysis.

Prerequisite: DH 351.

### **DH 354 Periodontology**

(3-0-3)

Evidence-based approach for treatment of periodontal disease including nonsurgical and surgical treatment. Root anatomy relating to effective instrument adaptation. Treatment

planning for patients with all types of classifications of periodontal disease.

Prerequisite: DH 254.

### **DH 363 Dental Materials**

(2-3-3)

General properties, composition and manipulation of common dental materials. Expanded functions including denture relines and amalgam polishing are practiced.

### **DH 366 Dental Anatomy**

(2-0-2)

In-depth study of crown and root morphology of primary and permanent dentitions with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

### **DH 370, DH 371, DH 372 International Externship**

(1-0-1)(1-0-1)(0-3-1)

Sequential courses preparing for and providing dental hygiene care at an international site using portable dental equipment. Cultural issues, teamwork, financing, needs assessment, goal setting and delivery of program.

Prerequisites: For DH 370–DH 321 and DH 381.

Prerequisite: For DH 371–DH 370.

Prerequisite: For DH 372–DH 371.

### **DH 380 Community Dental Health I**

(1-3-2)

Childhood education techniques provided and implemented within the community. Systemic fluoride and its controversial effects debated. Teamwork skills.

Prerequisite: DH 241.

Corequisite: DH 242.

### **DH 381 Community Dental Health II**

(1-3-2)

Needs assessments and budget developed along with a project plan for a community oral health project. Educating and working with adolescents. Projects will be conducted in local schools. Teamwork techniques practiced.

Prerequisite: DH 380.

### **DH 382 Community Dental Health III**

(1-3-2)

The ongoing community oral health project will be implemented. Formative and summative evaluations compared and utilized in project. The dental hygienist's role in managed care. The various structures, ethics, and

alternatives of public health.

Prerequisite: DH 381.

### **DH 383 Community Dental Health IV**

(0-3-1)

Conclusion, evaluation and future recommendations of community oral health project. Formal written presentation of project. In-depth look at geriatric clients and their needs. Students will experience different settings in the local geriatric community.

Prerequisite: DH 382.

### **DH 399 Laboratory Practice**

(Hours to be arranged each term.)

### **DH 401 Overview of Advanced Dental Hygiene**

(3-0-3)

Introduction to the online degree completion program. Career opportunities, roles of the dental hygienist, and the different emphases within the program are explored.

### **DH 421, DH 422, DH 423 Dental Hygiene Clinical Practice and Seminar VII, VIII, IX**

(421-SU)(2-6-4)(422-F)(1-12-5)(423-W)

(1-12-5)

Further refinement of clinical instrumentation and assessment skills. Emphasis on individualized care for patients with special needs. Variety of off campus clinical practice settings experienced.

Prerequisite: For DH 421–DH 323.

Prerequisite: For DH 422–DH 421.

Prerequisite: For DH 423–DH 422.

### **DH 430 Dental Hygiene Board Review**

(2-0-2)

Designed to help students prepare for their national board exam. Multiple-choice test-taking skills are practiced. Mock tests simulating the real exam are used.

### **DH 453 Current Issues in Dental Hygiene**

(3-0-3)

Current topics and issues related to dental hygiene practice are explored.

Prerequisite: Admission to BDHO program.

### **DH 454 Dental Practice Management**

(3-0-3)

Profitability of the Dental Hygiene Department; practice models, office design; patient

satisfaction; financing options for the patient. Technology's impact on practice management.

Prerequisite: DH 323.

### **DH 455 Dental Hygiene Research**

(3-0-3)

Students choose a topic, conduct library and clinical research and document results.

Prerequisites: DH 453, MATH 243 and admission to BDHO program.

### **DH 461, DH 462, DH 463 Restorative Dentistry I, II, III**

(1-3-2)(1-3-2)(0-6-2)

Properties of restorative dental materials. Practical experience using restorative dental materials. Placement and finishing of amalgam and composite restoration on typodonts in Restorative Dentistry I and on patients in Restorative Dentistry II and III.

Prerequisite: For DH 461–DH 363.

Prerequisite: For DH 462–DH 461.

Prerequisite: For DH 463–DH 462.

### **DH 467 Restorative Functions Endorsement**

(2-2-4)

This course fulfills the Oregon Board of Dentistry (OBD) requirements for the restorative endorsement for dental assistants and dental hygienists. Lecture, lab practice on typodonts and clinical practice with patients. Additional testing is required by the OBD following course completion.

Prerequisite: AS or BS in Dental Hygiene or EFDA (Expanded Function Dental Assistant).

### **DH 470 Community Program Planning I**

(2-3-3)

First in a two course sequence. Students identify a target population and work with the community to assess, analyze, plan and budget for a community health project. Requires communication skills, networking, critical thinking and research.

Prerequisite: AHED 450 and admission to BDHO program.

### **DH 471 Community Program Planning II**

(1-6-3)

Second course in Community Program Planning sequence. Community projects planned in DH 470 are implemented and evaluated.

Prerequisite: DH 470 and admission to BDHO program.

### **DH 475 Dental Hygiene Research Methods I**

(2-0-2)

First in a series of three courses with the goal of writing a systematic review of the literature. Evidence based decision making will lay the foundation for the course. Research design and literature search are emphasized; critical appraisal is introduced.

Prerequisite: DH 323

### **DH 476 Dental Hygiene Research Methods II**

(2-0-2)

Second in a series of three courses focusing on evidence-based decision making and critical analysis of current literature. Students will search and critique various types of research designs to lay the foundation to prepare a systematic review.

Prerequisite: DH 475.

### **DH 477 Dental Hygiene Research Methods III**

(2-0-2)

Third in a series of three courses focusing on evidence-based decision making and critical analysis of current literature. In small groups, students will research a clinical question in PICO format, conduct and analyze research, and write a Systematic Review.

Prerequisite: DH 476.

### **DH 480 Community Health Practicum**

(0-9-3)

Students design a community health project and gain practical experience providing dental hygiene care and education in a community group setting.

Prerequisite: AHED 450, DH 470.

### **DH 495 Individual Studies**

(Hours to be arranged each term.)

### **DH 499 Laboratory Practice**

(Hours to be arranged each term.)

## **(DHE) Dental Hygiene, (Extended)**

### **DHE 100 Introduction to Dental Hygiene I**

(2-0-2)

Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed.

### **DHE 107, DHE 207, DHE 307 Seminar**

(Hours to be arranged each term.)

### **DHE 211 Principles of Dental Hygiene I**

(2-0-2)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

### **DHE 212 Principles of Dental Hygiene II**

(2-3-3)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 211.

### **DHE 213 Principles of Dental Hygiene III**

(3-0-3)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 212.

### **DHE 221 Dental Hygiene Clinical Practice I**

(0-9-3)

Sequential course designed to provide clinical skills essential for the practice of dental hygiene. Skill development in the areas of patient appraisal, basic instrumentation, and individualized preventive care emphasized.

### **DHE 222 Dental Hygiene Clinical Practice II**

(0-12-4)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 221.

### **DHE 223 Dental Hygiene Clinical Practice III**

(0-12-4)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking

ing related to patient assessment and management. Communication skills emphasized. Prerequisite: DHE 222.

### **DHE 225 Head and Neck Anatomy, Histology and Embryology**

(2-3-3)

Anatomy of head and neck integrated with histology and embryology of head neck structures, and oral and dental tissues.

### **DHE 233 Periodontology**

(3-0-3)

First of a two-course sequence emphasizing periodontal diseases, their classifications, and the etiological factors involved. Preventive measures within the scope and responsibility of the dental hygienist are correlated with basic sciences and clinical aspects of periodontal diseases.

### **DHE 244 General and Oral Pathology**

(3-0-3)

Introduction to general pathology and common oral pathologies. Basic pathology, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

### **DHE 252 Oral Radiology I**

(2-3-3)

Theoretical background and practical application for dental radiography. Exposure techniques, processing, mounting and evaluation of dental radiographs; physical principles of production; clinical use of X-radiation and radiation safety procedures.

### **DHE 253 Oral Radiology II**

(2-0-2)

Techniques for patients with special needs, extra-oral procedures, occlusal projections, radiographic detection and interpretation of potential pathology. Introduction to panoramic exposure techniques and images and refinement of techniques in exposure, processing and radiographic evaluation. Prerequisite: DHE 252.

### **DHE 261 Dental Health Education**

(3-0-3)

An application of the concepts of preventive dentistry. Course includes oral health instruction for the individual patient based on an understanding of the causes and means

to control dental disease. Selection and evaluation of oral physiotherapy aids, patient education, and other materials will be investigated. Concept of effective patient communication and motivation will be emphasized.

### **DHE 275 Dental Ethics**

(2-0-2)

Professional ethics and legal requirements of the dental profession.

### **DHE 282 Medical and Dental Emergency Procedures**

(2-3-3)

Equipment, drugs, signs, symptoms and treatment of medical emergencies that may occur in dental offices. Individual and team practice in carrying out emergency procedures (pulse, respiration, blood pressure, IV setup, oxygen, cardiopulmonary resuscitation, etc.) in timed simulations.

### **DHE 299 Laboratory Practice**

(Hours to be arranged each term.)

### **DHE 311 Principles of Dental Hygiene IV**

(3-0-3)

Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Students will learn how to promote patient adherence to disease prevention and health maintenance using evidence-based strategies.

Prerequisite: DHE 213.

### **DHE 312 Principles of Dental Hygiene V**

(3-0-3)

Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to clinical cases. Care of special needs populations emphasized.

Prerequisite: DHE 311.

### **DHE 313 Principles of Dental Hygiene VI**

(4-0-4)

Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to clinical cases. Interviewing skills, career opportunities and alternative practice settings discussed. Community health programs evaluated.

Prerequisite: DHE 312.

### **DHE 320 Dental Materials and Chairside Assisting**

(2-3-3)

A study of the general properties, composition and manipulation of common dental materials as well as practical application of these materials at the chairside utilizing the concepts of four-handed dentistry.

Prerequisite: DHE 205.

### **DHE 321 Dental Hygiene Clinical Practice IV**

(0-12-4)

Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced.

Prerequisite: DHE 223.

### **DHE 322 Dental Hygiene Clinical Practice V**

(0-12-4)

Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced.

Prerequisite: DHE 321.

### **DHE 323 Dental Hygiene Clinical Practice VI**

(0-15-5)

Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced.

Prerequisite: DHE 322.

### **DHE 333 Periodontal Therapy**

(3-0-3)

Philosophy and theoretical background of advanced periodontal issues of all supportive structures are explored. Various periodontal surgery techniques are studied.

Prerequisite: DHE 233.

### **DHE 344 Advanced General and Oral Pathology**

(3-0-3)

Further study of general and oral pathology. Developmental, hereditary, and congenital disorders. Endocrine, cardiovascular, hematopoietic, respiratory, gastrointestinal, neurologic, and skeletal disorders. Tooth abnormalities, radiographic lesions, and oral tissue enlargements. Systemic and oral complications of HIV and AIDS. Lesion

description emphasized.  
Prerequisite: DHE 244.

### **DHE 351 Dental Analgesia**

(2-3-3)

This course explores pain control methods, including local anesthesia and nitrous oxide oxygen analgesia. Health history evaluation, local and systemic complications, anesthetic solutions, and vasoconstrictors and drug interactions are discussed. Techniques of local anesthesia, including block and infiltration injections are practiced. Administration of nitrous oxide is also practiced.

Prerequisites: DHE 205, DHE 282.

### **DHE 366 Dental Anatomy**

(2-0-2)

In-depth study of crown and root morphology of primary and permanent dentitions with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

### **DHE 380 Oral Health Planning and Care I**

(2-3-3)

Major concepts of public health including epidemiology, prevention and financing are covered. A systematic approach to planning group oral health projects begins.

### **DHE 381 Oral Health Planning and Care II**

(2-6-4)

Biostatistics and careers in public health are explored. Community oral health projects are implemented and evaluated. Table clinics and portfolios that document components of projects are presented.

Prerequisite: DHE 380.

### **DHE 399 Laboratory Practice**

(Hours to be arranged each term.)

## **(DMS) Diagnostic Medical Sonography**

**DMS 107, DMS 207, DMS 307, DMS 407 Seminar**

(Hours to be arranged each term.)

### **DMS 223 Applications of Abdominal Sonography I**

(3-0-3)

History of sonography. Orientation to patient history, abdominal cross-sectional anatomy,

scanning and normal sonographic presentation.

Prerequisite: MIT 103 with grade "C" or better.

### **DMS 224 Applications of Abdominal Sonography II**

(3-0-3)

Orientation to cross-sectional abdominal anatomy and pathology of organs and vessels. Procedures and techniques, including scanning.

Prerequisite: DMS 223 with grade "C" or better.

### **DMS 225 Applications of Abdominal Sonography III**

(3-0-3)

Advanced abdominal scanning procedures and techniques. Emphasis on superficial structures invasive procedures and Doppler correlation, including scanning.

Prerequisites: DMS 224 and DMS 253 with grade "C" or better.

### **DMS 234 Pelvic Sonography**

(3-0-3)

Orientation to male and female pelvic cross-sectional anatomy and pathology, differentiating between normal variations and abnormalities to include first trimester obstetrics and trans-vaginal scanning.

Prerequisites: DMS 224 and DMS 253 with grade "C" or better.

### **DMS 235 Diagnostic Medical Sonography Patient Care**

(3-0-3)

Sonographic management and applications of cognitive, psychomotor, and interpersonal skills as they relate to the health care consumer. Patient assessment and communication, body mechanics, medical and surgical asepsis, medical emergencies, pharmacology and analysis of ethical and legal issues.

Prerequisite: DMS 223 with grade "C" or better.

### **DMS 252 Sophomore Laboratory I**

(0-3-1)

Applied scanning of right upper quadrant anatomy stressing imaging planes. Gray scale instrumentation, system-optimization, preventive maintenance, and quality hard copy imaging.

Prerequisite: Sophomore standing in the DMS program.

Corequisite: DMS 223.

### **DMS 253 Sophomore Laboratory II**

(0-3-1)

Applied scanning of the remainder of the abdominal cavity stressing anatomy, standard imaging planes, Doppler correlation and hard copy quality. Imaging review of prior anatomical areas.

Prerequisites: BIO 335, DMS 223, DMS 252 with grade "C" or better.

Corequisites: DMS 224, MIT 231.

### **DMS 254 Sophomore Laboratory III**

(0-3-1)

DMS orientation to cross-sectional pelvic anatomy and pathology of the male and female pelvis. Procedures and techniques, including scanning.

Prerequisites: DMS 224 and DMS 253 both with grade "C" or better.

Corequisite: DMS 225.

### **DMS 315 Sonographic Superficial Structures**

(3-0-3)

Survey of superficial imaging applications with emphasis on normal and abnormal musculoskeletal and breast sonography.

Prerequisite: DMS 234 with grade "C" or better.

### **DMS 316 Survey of Vascular Technology**

(3-0-3)

Orientation to vascular physics, equipment, and colorflow imaging. Explanation of Doppler imaging in relation to vascular anatomy.

Prerequisite: DMS 234, DMS 235, and DMS 352 with grade "C" or better.

### **DMS 342 Survey of Adult Echocardiography**

(3-0-3)

Survey of adult echocardiographic imaging applications with emphasis on parasternal, apical, subcostal and suprasternal 2-D views. Standard M-Mode measurements, Doppler and color Doppler. Common cardiac pathology.

Prerequisite: DMS 352 with grade "C" or better.

### **DMS 343 Fetal Echo, Neonatal, and Pediatric Sonography**

(3-0-3)

Fetal cardiac development and normal anatomy. Fetal echocardiographic 2D views, M-Mode, Doppler and Color Doppler. Common fetal cardiac pathology and anomalies.

Neonatal topics include hip, abdominal and neurological sonographic applications. General sonographic pediatric pathologies and anomalies will be discussed.

Prerequisites: DMS 342 and DMS 372 both with grade "C" or better.

### **DMS 352 Junior Laboratory I**

(0-3-1)

Applied scanning of the male and female pelvis stressing anatomy, standard imaging planes and hard copy quality. MedSim and phantom scanning of pelvic, endovaginal and first trimester applications. Imaging review of prior anatomical areas.

Prerequisite: DMS 254 with grade "C" or better.

### **DMS 353 Junior Laboratory II**

(0-3-1)

Applied scanning of normal first, second and third trimester stressing anatomy, standard imaging planes and image quality using the MedSim systems. Doppler examinations of the carotid and lower extremity systems. Imaging review of prior anatomical areas.

Prerequisite: DMS 352 with grade "C" or better.

Corequisites: DMS 316, DMS 371.

### **DMS 354 Junior Laboratory III**

(0-3-1)

Applied scanning of abnormal first, second, and third trimester scanning on the MedSim systems stressing pathology and additional imaging requirements. Final competencies of all prior imaging areas stressing image quality.

Prerequisite: DMS 353 with grade "C" or better.

Corequisites: DMS 365, DMS 373.

### **DMS 365 Sonographic Pathology**

(3-0-3)

Differential diagnosis and concepts of disease processes as applied to sonographic examination.

Prerequisite: Junior standing in DMS.

### **DMS 371 Obstetrical Sonography**

#### **First Trimester**

(3-0-3)

Introduction to first trimester obstetrical ultrasound procedures and techniques. Emphasis on normal and abnormal sonographic first trimester presentation.

Prerequisites: DMS 224, DMS 225 and DMS 234 with grade "C" or better.

### **DMS 372 Obstetrical Sonography** **Second/Third Trimester**

(3-0-3)

Orientation to obstetrical scanning procedures and techniques. Emphasis on normal second and third trimester obstetrical anatomy.

Prerequisite: DMS 371 with grade "C" or better.

### **DMS 373 Obstetrical Pathology**

(3-0-3)

Advanced obstetrical scanning of second and third trimester obstetrical patients with emphasis on pathology.

Prerequisite: DMS 372 with grade "C" or better.

### **DMS 388 Externship Preparation**

(2-0-2)

Presentation of key concepts related to Diagnostic Medical Sonography externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the DMS Externship Handbook.

Prerequisites: DMS 316, DMS 353 and DMS 371 with grade "C" or better.

Corequisites: DMS 365, DMS 373,

### **DMS 430 Diagnostic Medical** **Sonography Externship**

(0-40-15)

All B.S. students must complete four terms (12 months) of clinical experience in sonography at an Oregon Tech approved clinical site. Students will work under the direct supervision of registered sonographers.

Prerequisites: All academic coursework in the Diagnostic Medical Sonography curriculum.

### **DMS 430A, DMS 430B Diagnostic** **Medical Sonography Externship**

(430A, 0-22-8)(430B, 0-18-7)

This two-term special externship is designed for the degree completion student. Students working in a clinical ultrasound setting will prepare clinical case studies.

Prerequisites: Be an ARDMS Sonographer in good standing and have completed all academic coursework in the Medical Imaging curriculum with grade "C" or better.

## **(ECHO)**

### **Echocardiography**

**ECHO 107, ECHO 207, ECHO 307,  
ECHO 407 Seminar**

(Hours to be arranged each term.)

### **ECHO 225 Cardiopulmonary Patient** **Management Practices**

(2-3-3)

Current issues in the practice of echocardiography with emphasis on the technologist's responsibilities to the patient, the patient's family and the professions of echocardiography. Transporting critically ill patients and recognizing emergency situations.

Prerequisite: ECHO 231.

### **ECHO 227 Basic ECG Recognition** **and Testing**

(3-0-3)

Basics of ECG testing, heart pressures, blood volume/physiology and the electrical conduction system. Focus on interpretation of ECG rhythms: normal ECG, ventricular hypertrophy, bundle branch block, AV block, myocardial ischemia, bradycardia, tachycardia, atrial fibrillation, ventricular fibrillation and irregular rhythms.

### **ECHO 231 Echocardiography I**

(3-3-4)

An introduction to scanning techniques and tomographic views according to the American Society of Echocardiography standards. B-mode image, pulsed and continuous wave Doppler, and color-flow imaging.

Prerequisite: ECHO 320.

### **ECHO 232 Echocardiography II**

(3-3-4)

An intermediate level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Emphasis on cardiac pathology and the echocardiography evaluation.

Prerequisite: ECHO 231.

### **ECHO 320 Cardiographic Methods**

(3-0-3)

Recognition of ECG tracing with normal and abnormal arrhythmias, treadmill testing, holter monitoring, phonocardiography, and heart auscultation. Review of case examples for analysis and synthesis. Integration of cardiographic monitoring methods with cardiac ultrasound imaging. Review of cardiac anatomy.

Prerequisite: Admission into MIT Echocardiography Program.

### **ECHO 321 Stress and Transesophageal Echo**

(3-0-3)

Cardiac applications, protocols, and techniques related to stress echo and transesophageal echo. TEE anatomy, acquisition of images and the cardiovascular operating room. Particular emphasis on the mitral valve and surgical repairs.

Prerequisite: ECHO 232.

### **ECHO 325 Pediatric Echocardiography**

(3-0-3)

Congenital heart disease, including neonate/infant and adult disorders. Congenital disorders including cardiac situs, ventricular morphology, great artery connections, valvular and subvalvular obstruction, atrial septal defect, ventricular septal defect.

Prerequisite: ECHO 333.

### **ECHO 332 Invasive Cardiology**

(3-0-3)

Cardiac catheterization testing. Coronary artery interventions such as percutaneous coronary intervention (PCI) and chamber pressure measurements.

Prerequisite: ECHO 231.

### **ECHO 333 Echocardiography III**

(3-3-4)

An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Cardiac pathology, and advanced methods in echocardiography.

Prerequisite: ECHO 232.

### **ECHO 334 Echocardiography IV**

(3-3-4)

An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Special topics including 3-D, 4-D, tissue Doppler, cardiac resynchronization and other technological advances.

Prerequisite: ECHO 333.

### **ECHO 365 Abdominal/Renal Testing**

(3-3-4)

Abdominal vascular anatomy and common disease processes. Students will be asked to perform basic abdominal vascular tests following very specific protocols and interpretations.

Prerequisites: ECHO 325, ECHO 376.

Corequisites: ECHO 385, ECHO 388.

### **ECHO 376 Survey of Vascular Testing**

(2-3-3)

Basic vascular pathophysiology in carotid, arterial, and venous testing. Waveform recognition, interpretation, and protocols for testing. Prerequisite: ECHO 333.

### **ECHO 385 Echocardiography Laboratory Management**

(3-0-3)

Focus on human resource skills as necessary to manage an echocardiography laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

### **ECHO 388 Externship Preparation**

(3-0-3)

Review and summarization of key concepts in Echocardiography. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent echo lab. Review and discussion of the Echocardiography Externship Handbook.

Corequisite: ECHO 334.

### **ECHO 420 Echocardiography Externship**

(0-40-15)

Students work as registered professionals in the field and must complete nine months (three terms) of experience in Echocardiography.

Prerequisite: Admission to Echocardiography Degree Completion Program.

### **ECHO 420A Echocardiography Externship**

(0-22-8)

Students work as registered professionals in the field. Patient echo exams with normal and abnormal stress tests, normal and abnormal wall motion. Case study presentation.

Prerequisite: Admission to Echocardiography Degree Completion Program.

### **ECHO 420B Echocardiography Externship**

(0-18-7)

Students work as registered professionals in the field. Cardiac surgical echoes (TEE) and contrast studies using various pharmacologi-

cal agents. Case study presentation.

Prerequisite: Admission to Echocardiography Degree Completion Program.

### **ECHO 421 Echo Senior Project**

(4-0-4)

Students design a research-based senior project in the field of echocardiography, including interviews, research, literature review and formal presentation of the project.

Prerequisites: ECHO 420; WRI 123 or WRI 227.

## **(ECO) Economics**

### **ECO 107, ECO 207, ECO 307, ECO 407 Seminar**

(Hours to be arranged each term.) SS

### **ECO 201 Principles of Economics, Microeconomics**

(3-0-3) SS

Topics include scarcity, consumer choice, supply and demand, elasticity, cost and pricing theory, theory of market structures (competition, monopoly, monopolistic competition, oligopoly).

Prerequisite: College level math.

### **ECO 202 Principles of Economics, Macroeconomics**

(3-0-3) SS

An introduction to the economic problem. Topics include gross domestic product, unemployment, monetary policy, fiscal policy, macro equilibrium, inflation, and supply and demand.

Prerequisite: College level math.

### **ECO 203 Principles of Economics, Special Topics**

(3-0-3) SS

A survey of micro- and macroeconomic topics of current interest. Topics may include labor practices, international economics, natural resource economics, urban planning, and economic policy issues. Students prepare a research paper and present results to the class.

Prerequisites: ECO 201, ECO 202.

### **ECO 357 Energy Economics and Policy**

(3-0-3) SS

Explores the role of energy and energy resources from the economic perspective. Analyzes U.S. and global energy markets and policy; traditional and alternative energy sources; pricing of externalities and public

goods; the use of market instruments, subsidies and taxes; and the political economy. Prerequisites: ECO 201 or ECO 202, and MATH 243 or MATH 361.

### **ECO 367 International Economics and Finance Management**

(4-0-4) SS

Financial management involving international monetary environment; foreign exchange risk management; source and availability of funds to finance trade and multinational operations; taxation planning and control; international portfolio diversification; international banking; capital budgeting; political risk evaluation of performance.

Prerequisites: BUS 308 and ECO 201 or ECO 202.

## **(EE) Electrical Engineering**

**EE 101, EE 102, EE 103**

### **Introduction to Engineering I, II, III**

(0-3-1) (0-3-1) (0-3-1)

A three course sequence introducing the field of engineering, focusing on electrical engineering and renewable energy. Success strategies. Engineering and scientific notation. Ohm's Law. Problem solving, communication skills, ethics in engineering. Professional development and lifelong learning. Introduction to the design process culminating in a team design experience.

### **EE 107, EE 207, EE 307, EE 407 Seminar**

(Hours to be arranged each term.)

### **EE 131 Digital Electronics I**

(3-3-4)

Introduction to combinational logic, gates, Boolean Algebra, Karnaugh Mapping, Number Systems/Codes, arithmetic circuits, decoders/ encoders, mux/demux, comparators, basic sequential gates (Latches/FF) introduction to HDL (Verilog/VHDL), PLD HW implementation.

Pre- or corequisite: MATH 111.

### **EE 133 Digital Electronics II**

(3-3-4)

Introduction to sequential logic, with HDL, Review latches and flip/flops, timers, counters/ registers, HDL implementation, PLD HW Implementation, finite state machine

design/ analysis, logic testing and timing analysis.

Prerequisites: CST 162 or EE 131 with grade "C" or better, MATH 111.

### **EE 221 Circuits I**

(3-3-4)

DC and AC principles and analysis. Ohm's law. Kirchhoff's laws. Nodal analysis. Loop analysis. Source transformations. Thevenin and Norton equivalent circuits. Maximum power transfer. Sinusoidal signals. Basic magnetic fields. Lenz's law. Induced currents. Inductance. Basic electric fields. Capacitance. Reactance. Complex impedance. Phasors and steady-state analysis.

Corequisite: MATH 251.

### **EE 223 Circuits II**

(3-3-4)

Single phase AC power. Transformers. Balanced three-phase power. Ideal op-amp. Basic op-amp circuits. First- and second-order circuits and transients. Steady-state frequency response. Bode plots. First- and second-order passive filters (LP, HP, BP). Resonance. Active op-amp filters. Prerequisite: EE 221, with grade "C" or better.

Corequisite: MATH 252.

### **EE 225 Circuits III**

(3-3-4)

Laplace Transform definitions and properties. Laplace applications. Laplace circuit analysis, including stability concepts. Fourier series. Fourier transform definitions and properties. Steady-state Fourier circuit analysis. Basic two-port parameters and analysis.

Prerequisite: EE 223 with grade "C" or better.

Corequisite: MATH 321.

### **EE 236 LabVIEW Programming**

(3-3-4)

An object oriented programming course using National Instruments LabVIEW programming language designed for programming data-logging, instrumentation and control applications. Basic flow-charting is introduced. Logical constructs as implemented by LabVIEW are investigated. Example control problems are investigated and programmed using LabVIEW.

Prerequisite: MATH 112.

### **EE 301 Optoelectronics I – Optoelectronic Devices and Optical Detection**

(3-3-4)

Optoelectronic devices including polarizers, retarders, filters, modulators, monochromators, lock-in amplifiers. Propagation of radiation through optical systems. Optical detectors including photovoltaic and photoconductive devices, pyroelectric detectors, linear and area arrays. Photodetector noise, and post-detection electronic amplifiers and filters.

Prerequisites: MATH 253N, PHY 223.

### **EE 303 Optoelectronics II – Lasers**

(3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, resonator stability, beam shape, mode structure, beam modification with intracavity elements. Study of ion, molecular, solid-state, dye and semiconductor lasers.

Prerequisite: EE 301 with grade "C" or better.

### **EE 305 Optoelectronics III – Fiber Optic Principles and Applications**

(3-3-4)

Light propagation in fibers, fiber types, fiber manufacture, light sources, optical detectors. Termination, coupling, and splicing of fibers. Introduction to fiber optic communication and sensors. Fiber devices, optical time domain reflectometry, fiber amplifiers, fiber lasers, and fiber sensors.

Prerequisites: EE 341, EE 301 both with grade "C" or better.

### **EE 311 Signals and Systems**

(3-3-4)

Spectrum. Fourier Series. Time-Frequency Spectrum. Sampling and Aliasing. Reconstruction. Sampling Theorem. Discrete-Time Signals and Systems. Convolution Sum. Continuous-Time Signals and Systems. Frequency Response. Continuous-Time Fourier Transform. Relationship between CTFT, DTFT, DFT, and FFT. Spectrogram. Z-Transform.

Prerequisite: EE 225 with grade "C" or better.

### **EE 320 Advanced Circuit and Systems Analysis**

(4-3-5)

Methods of circuit analysis and circuit theorems. Introduction to the Laplace transform

and its applications. Advanced circuit analysis using Laplace transforms techniques. Transfer function analysis. Impulse and frequency response of circuits and systems. Bode plots. Stability.

Prerequisites: EE 223 or EET 218, MATH 252.

### EE 321 Electronics I

(4-3-5)

Basic semiconductor theory. Diodes and diode circuits. Bipolar-junction transistor (BJT). Ebers-Moll model. BJT amplifiers (CE, CB & CD). Multistage and differential amplifiers. MetalOxide-Semiconductor Field-Effect Transistor (MOSFET). MOSFET amplifiers (CS, CG & CD). Multistage MOSFET amplifiers. OP-amps.

Prerequisites: EE 223 or EET 218, MATH 252.

### EE 323 Electronics II

(4-3-5)

Current sources. Current mirrors. Cascode active loads. Multistage amplifiers. Differential amplifiers. Frequency response. Miller's theorem. Negative feedback amplifier types: Voltage, Current, transconductance and transresistance. Stability and pole location. Gain and phase margins. Frequency compensation.

Prerequisite: EE 321.

### EE 325 Electronics III

(4-3-5)

Real operational amplifiers and basic circuits. Output stages. Power amplifiers. Filters, passive and active. Oscillators. Wave-shaping circuits. D/A and A/D circuits.

Prerequisite: EE 323, with grade "C" or better.

### EE 331 Digital System Design with HDL

(3-3-4)

Introduces the student to a Hardware Descriptive Language and describes its role in digital design. Dataflow, Behavioral and Structural Modeling, Logic Partitioning, Hierarchical Design, CPLDs and FPGAs. DC Parameters and CPLD Timing Models. Design examples including keyboard scanner, counters, ALUs, multipliers and controllers.

Prerequisite: CST 133 or EE 133 or EET 216.

### EE 333 Microcontroller Engineering

(3-3-4)

Microcontroller engineering using popular microcontroller, internal structures and

control units, timing, interrupts and memory interfacing, assembly language programming specific to microcontroller, on-chip peripheral devices.

Prerequisite: CST 133 or EE 133 or EET 216.

### EE 335 Advanced Microcontroller Engineering

(3-3-4)

Second course Microcontroller Engineering, further use programmable microcontroller peripherals, A/D conversion, PWM, synchronous serial.

Prerequisite: EE 333 with grade "C" or better.

### EE 341 Electricity and Magnetism with Transmission Lines

(4-0-4)

Review vector calculus. Flux, potential, gradient, divergence, curl and field intensity. Static electric and magnetic fields. Maxwell's equations. Boundary conditions. Uniform plane waves in media and free space. Reflection and transmission at interfaces. Propagation of guided waves. Transmission line. Antennas.

Prerequisites: EE 221 or EET 218; MATH 254N, PHY 222.

### EE 343 Solid-State Electronic Devices

(3-0-3)

Crystal properties and growth of semiconductors. Atoms and electrons. Energy bands and charge carriers in semiconductors. Excess carriers in semiconductors. p-n junctions. FETs and BJTs. Optoelectronic devices. High-frequency and high-power devices.

Prerequisite: PHY 222.

Corequisite: EE 321.

### EE 347 Digital Logic

(3-3-4)

Number systems; combinational logic including Boolean algebra, DeMorgan's Theorems and Karnaugh Maps; digital TTL, CMOS IC characteristics; conventional IC functions; sequential logic including flip-flops, counters, registers and state diagrams. Combinational and sequential logic circuits will be simulated, built and tested.

Prerequisite: MATH 112.

### EE 351 Radiometry & Optical Detection

(3-3-4)

Fundamentals of radiometry and photometry; detection of light using thermal and

photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223

### EE 352 Geometric Optics

(3-3-4)

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

### EE 353: Physical Optics

(3-3-4)

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

### EE 355 Control System Design

(3-3-4)

Continuous-domain systems and Laplace transform review. System modeling, identification and linearization. System response and stability analysis. Classical tracking and regulating controller design using computers. PID tuning. Lab exercises in modeling, design and implementation.

Prerequisites: EE 225 or EE 320; EE 321.

### EE 401 Communication Systems

(4-3-5)

Signal Analysis, Fourier series, Fourier Transforms; Analog signal transmission and Reception (AM, FM, PM); effects of noise in Analog Systems. Digital Data and Communication Systems; effects of noise in Digital Systems.

Prerequisite: EE 311 or EE 430.

### EE 411, EE 412, EE 413 Senior Project I, II, III

(1-3-2)(0-6-2)(0-6-2)

A three-term sequence integrating electrical engineering design, group dynamics, and technical communications. Multidisciplinary student teams will be introduced to a major electrical engineering project, ideally supplied by an industrial client working in health-related technologies, optoelectronics or renewable energy engineering. The first term will culminate in a formal written proposal.



Student teams will perform engineering design work as defined in the proposal during the second and third terms. The final design and recommendations will be presented orally and in a comprehensive final report. Entire sequence must be completed in three consecutive terms.

Prerequisite: Senior standing in EE.

Pre- or Corequisites: WRI 327.

### **EE 419 Power Electronics**

(3-3-4)

Power electronic device characteristics.

Converter circuits: AC/DC, DC/DC, DC/AC. Converter design, modeling and control. Drive and snubber circuits. Thermal and magnetic effects.

Prerequisite: EE 321 with grade "C" or better.

### **EE 421 Analog Integrated – Circuit Design**

(4-3-5)

Models of IC active devices. Review single-transistor and multiple-transistor amplifiers. Current mirrors, active loads, and references. Output stages. Operational amplifiers with single-ended outputs. Frequency response of ICs, noise in ICs, bipolar, MOS and BiC-MOS IC technology.

Prerequisite: EE 323.

Corequisite: EE 325.

### **EE 423 CMOS Digital Integrated-Circuit Design**

(4-3-5)

MOSFETs, threshold voltage, body effect, channel length, CMOS, inverter characteristics, transmission gates, performance (latch-up, parameter estimation, capacitance), domino logic, registers, scan test, layout.

Prerequisites: CST 133 or EE 133 or EET 216; EE 321.

### **EE 425 Wireless Communication**

(3-3-4)

Baseband digital systems, messages, characters and symbols, sampling theorems. Noise sources, M-ary signals, baseband formatting including PCM waveforms, digital filters including FIR and IIR. Matched filters, band-pass modulation and demodulation techniques, and an introduction to spread spectrum transmission.

Prerequisites: EE/CST 133 and EE 223, both with grade "C" or better.

### **EE 430 Linear Systems and Digital Signal Processing**

(4-3-5)

Introduction to signals and systems. Spectral analysis techniques. Fourier Series and the continuous-time Fourier transform (CTFT). Discrete-time Fourier transform (DTFT) and digital Fourier transform (DFT). Computational spectral analysis using the FFT. FIR and IIR filters. Z-transform. Practical implementation of digital filters and computational spectral analysis using MATLAB.

Prerequisite: EE 225 or EE 320.

### **EE 431 Digital Signal Processing**

(3-0-3)

Discrete systems and signals, linear time invariant systems, difference equations, frequency response, Z-transforms, analysis software, discrete Fourier transforms.

Prerequisites: EE 311, EE 335, both with grade "C" or better.

### **EE 432 Advanced Digital System Design with HDL**

(3-3-4)

Advanced digital signal design with hardware description languages such as VHDL and Verilog. Practical application of principles of digital design to system design using FPGAs. Completion of a FPGA-based system design project.

Prerequisite: EE 331.

### **EE 441 Biomedical I – Introduction to Biomedical Engineering**

(3-3-4)

Introduction to biomedical engineering, anatomy and physiology for engineers, bioelectric phenomena, biomedical sensors, biomedical instrumentation, biosignal processing, cardiovascular mechanics, biomaterials, tissue engineering, biomedical imaging and clinical engineering.

Prerequisite: EE 311 with grade "C" or better.

### **EE 443 Biomedical II – Signal Processing**

(3-3-4)

Fundamental problems of biomedical signal processing; signal analysis; signal modeling, sources and types of biomedical signals. Arterial and ambulatory blood pressure (ABP/ABPM); intracranial pressures (ICP); pulse oximetry (SpO<sub>2</sub>); electrocardiogram (ECG). Stochastic, harmonic models, spectrum analysis and time-frequency analysis.

Prerequisite: EE 311 with grade "C" or better.

### **EE 445 Biomedical III – Instrumentation**

(3-3-4)

Review of biological systems (human), signals, measurements and transducers; bio-electrical signals and amplifiers; electrocardiograph (ECG); blood pressure; ultrasonography; x-ray; radiology and nuclear medicine equipment; power sources; electro-magnetic interference (EMI) effects; and electrical safety.

Prerequisite: EE 311 with grade "C" or better.

### **EE 451 Lasers**

(3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisites: EE 353

### **EE 452 Waveguides and Fiber Optics**

(3-3-4)

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.

Prerequisite: EE 353

### **EE 453 Optical Metrology**

(3-3-4)

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisite: EE 353

## **(EET) Electronics Engineering Technology**

### **EET 101 Introduction to Circuit Analysis**

(3-0-3)

International system of units; engineering notation and prefixes; definitions of current, voltage, resistance, power, work and efficiency; Ohm's and Kirchhoff's laws; series and

parallel circuit principles; series-parallel DC resistive networks.

Corequisites: EET 102, MATH 100.

### **EET 102 Introduction to Circuit Analysis Laboratory**

(0-3-1)

Theoretical concepts discussed in EET 101 will be verified using available components and instrumentation.

Corequisite: EET 101.

### **EET 107, EET 207, EET 307, EET 407 Seminar**

(Hours to be arranged each term.)

### **EET 115 Network Theorems and Transient Analysis**

(3-0-3)

Current sources; source conversion; Thevenin, Norton and superposition theorems; capacitance; magnetics; inductance; transient analysis of RC and RL circuits.

Prerequisite: EET 101 with grade "C" or better.

Corequisites: EET 116, MATH 111.

### **EET 116 Network Theorems and Transient Analysis Laboratory**

(0-3-1)

Theoretical concepts covered in EET 115 verified using available components and instrumentation.

Prerequisite: EET 102.

Corequisite: EET 115.

### **EET 125 AC Circuit Analysis**

(4-0-4)

Sinusoidal AC voltage, phasors, average and effective values, impedance, AC series parallel circuits, AC power, AC network analysis, AC network theorems, dependent sources, transformers.

Prerequisite: EET 115 with grade "C" or better.

Corequisite: MATH 112.

### **EET 126 AC Circuit Analysis Laboratory**

(0-6-2)

Theoretical concepts discussed in EET 125 verified using available components, instrumentation, and computer simulations using PSPICE.

Prerequisite: EET 116 with grade "C" or better.

Corequisite: EET 125.

### **EET 143 DC and AC Circuit Fundamentals**

(5-0-5)

Network theorems applied to DC circuits: source conversions, Thevenin, Norton, superposition; capacitance; magnetic circuits; inductance; transient analysis of RC and RL circuits; sinusoidal waveforms; phasors; reactance and impedance; series, parallel, and series-parallel AC circuits.

Prerequisite: EET 101 with grade "C" or better.

Corequisites: EET 144 or EET 146; MATH 112.

### **EET 144 DC and AC Circuit Fundamentals Laboratory for LOET**

(0-3-1)

Laboratory companion to EET 143 for LOET majors only. This course will not count for EET or CSET majors. Theoretical concepts covered in lecture will be verified using available components and instruments. This course must be taken the same term as EET 143. Written laboratory reports are required.

Prerequisite: EET 102 with grade "C" or better.

Corequisite: EET 143.

### **EET 209 Introduction to Amplifiers and Semiconductor Devices**

(4-0-4)

Voltage, current, transresistance, transconductance, and differential amplifiers. Offset voltage, bias current, offset current. Two-port models. Frequency response, transfer characteristics, nonlinear distortion. Ideal operational amplifiers. Diodes, FETs and BJTs. I vs V characteristics, DC large-signal models, biasing, load-line analysis.

Prerequisite: EET 125 with grade "C" or better.

Corequisite: EET 210.

### **EET 210 Introduction to Amplifiers and Semiconductor Devices Laboratory**

(0-6-2)

Theoretical concepts discussed in EET 209 verified using available components and instrumentation. Computer simulation using PSPICE.

Prerequisite: EET 126 with grade "C" or better.

Corequisite: EET 209.

### **EET 215 Digital Circuits I**

(3-3-4)

Introduction to combinational logic, gates, boolean algebra, Karnaugh mapping, number systems/codes, arithmetic circuits, encoders/decoders, multiplexers/demultiplexers, comparators, parity, code conversions, introduction to HDL, PLD HW implementation.

Prerequisite: MATH 111.

### **EET 216 Digital Circuits II**

(3-3-4)

Introduction to sequential logic, latches, flip-flops, timers, counters, registers, finite state machines, logic testing. DC parameters and timing analysis.

Prerequisite: EET 215.

### **EET 217 Electric Circuits I**

(3-3-4)

DC Analysis and First-Order Transients. Ohm's law, Kirchhoff's laws, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, maximum power transfer, superposition, introduction to op-amps, inductance and capacitance, transient response of RC and RL circuits.

Prerequisite: MATH 111.

### **EET 218 Electric Circuits II**

(3-3-4)

AC Analysis, Second-Order Transients, introduction to electric power. Transient response of second-order circuits, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, sinusoidal steady-state power calculations, balanced three-phase circuits, mutual inductance, transformers.

Prerequisites: EET 217, MATH 112.

### **EET 219 Semiconductor Devices and Amplifiers**

(3-3-4)

Introduction to semiconductor devices, characteristics and biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as diodes and switches.

Prerequisite: EET 218.

### **EET 235 Transistor Amplifiers**

(4-0-4)

Linear small-signal equivalent circuit models. Design and analysis of transistor amplifiers,

n-channel, p-channel, JFET, MOSFET, npn, pnp common source, source follower, common-emitter, emitter follower, differential. Input impedance, output impedance, gain. Simple BJT and FET current mirrors. Midband frequency operation.

Prerequisite: EET 209.

Corequisite: EET 236.

### **EET 236 Transistor Amplifiers Laboratory**

(0-6-2)

Theoretical concepts discussed in EET 235 verified using available components and instrumentation. Computer simulation using PSPICE.

Prerequisite: EET 210.

Corequisite: EET 235.

### **EET 237 AC Circuits, Filters and Signals**

(3-0-3)

RC transient analysis, sinusoidal AC voltage, phasors, average and effective value, the decibel, simple RC transfer functions, low-pass, high-pass and band-pass filters, periodic and aperiodic signals in time and frequency, bandwidth. For non-EET majors.

Prerequisites: EET 221 or EET 115 with grade "C" or better; MATH 252.

Corequisite: EET 238.

### **EET 238 AC Circuits, Filters and Signals Laboratory**

(0-3-1)

Lab to accompany EET 237. For non-EET majors.

Prerequisites: EET 221 or EET 115 with grade "C" or better, MATH 252.

Corequisite: EET 237.

### **EET 243 Introduction to Digital Concepts**

(3-0-3)

Digital concepts covering Boolean algebra, algebraic simplification, number systems, and various combinational circuit elements (AND, OR, XOR, NAND, NOR gates). Combinational circuit implementation using NAND gates, NOR gates, decoders, encoders, multiplexers, and demultiplexers. Karnaugh Maps are used in the synthesis of combinational circuits.

Prerequisite: EET 125.

Corequisite: EET 244.

### **EET 244 Introduction to Digital Concepts Laboratory**

(0-3-1)

Circuits will be built using integrated circuits to reinforce the theoretical concepts discussed in EET 243. Computer simulation.

Prerequisite: EET 126.

Corequisite: EET 243.

### **EET 245 Digital Logic**

(3-0-3)

Combinational logic design using multiplexers, decoders, ROMs, and PLAs. Sequential circuit elements (flip-flops) presented along with applications such as counters and registers. Basic TTL and CMOS circuits analyzed.

Prerequisite: EET 243.

Corequisite: EET 246.

### **EET 246 Digital Logic Laboratory**

(0-6-2)

Combinational and sequential designs built using SSI, MSI, and LSI integrated circuits. Circuits tested and simulated.

Prerequisite: EET 244.

Corequisite: EET 245.

### **EET 249 Digital Logic Laboratory for LOET**

(0-3-1)

Laboratory companion to EET 245 for LOET majors only. This course will not count for EET or CSET majors. Theoretical concepts covered in lecture will be verified using available components and instruments. This course must be taken the same term as EET 245. Written laboratory reports are required.

Prerequisite: EET 244.

Corequisite: EET 245.

### **EET 265 Amplifier Frequency Response**

(4-0-4)

Bode Plots, effects of coupling and bypass capacitors, design of BJT and FET amplifiers, design of wideband amplifiers, tuned-circuit techniques, series and parallel resonance, tuned amplifiers, crystal-controlled oscillators.

Prerequisite: EET 235.

Corequisite: EET 266.

### **EET 266 Amplifier Frequency Response Laboratory**

(0-6-2)

Theoretical concepts discussed in EET 265 verified using available components and

instrumentation. Computer simulation using PSPICE.

Prerequisite: EET 236.

Corequisite: EET 265.

### **EET 275 Power Amplifiers and Special Devices**

(3-0-3)

Thermal modeling, power devices, class A amplifiers, transformer-coupled amplifiers, class B push-pull amplifiers, power supplies, rectifier circuits, zener diodes, voltage regulators, switching regulators, thyristors, SCRs, DIACs, TRIACs, optoelectronics, LEDs, photodiodes, phototransistors, optocouplers, selected devices.

Prerequisite: EET 235.

Corequisite: EET 276.

### **EET 276 Power Amplifiers and Special Devices Laboratory**

(0-6-2)

Theoretical concepts discussed in EET 275 verified using available components and instrumentation. Computer simulation using PSPICE.

Prerequisite: EET 236.

Corequisite: EET 275.

### **EET 281 Topics in Network Analysis**

(3-0-3)

Network theorems and techniques for direct and alternating currents. Transient response of circuits. Transfer function analysis. Frequency response of circuits. Designed for community college transfer students.

Prerequisite: Department approval.

Corequisite: MATH 251.

### **EET 283 Topics in Digital Circuits**

(2-3-3)

Combinational logic analysis and synthesis. Implementation of logic circuits with TTL and CMOS devices. Minimization techniques. Use of programmable logic arrays. Sequential circuits: flip-flop, counters, registers. Register-to-register transfer. Designed for community college transfer students.

Prerequisite: Department approval.

### **EET 285 Topics in Analog Devices and Circuits**

(3-0-3)

Analysis of AC small and large signal conditions for bipolar junction field-effect transistors and MOS field effect devices. Frequency effect of single stage amplifiers. Multistage amplifier circuits. Designed for community

college transfer students.

Prerequisite: Department approval.

Corequisites: MATH 251, EET 286.

### **EET 286 Topics in Analog Devices and Circuits Laboratory**

(0-3-1)

Laboratory companion to EET 285. Theoretical concepts discussed in lecture will be verified using available components and instrumentation. Must be taken during the same term with EET 285. Designed for community college transfer students.

Prerequisite: Department approval.

Corequisite: EET 285.

### **EET 298 Reading and Conference**

(Hours to be arranged each term.)

### **EET 299 Laboratory Practice**

(Hours to be arranged each term.)

### **EET 308 Introduction to MOS Microelectronics**

(3-0-3)

Introduction to microelectronics, semiconductor physics, integrated circuit (IC) technology, pn junction and MOS (Metal-Oxide-Semiconductor) electrostatics, MOS FETs (Field-Effect Transistors), selected digital circuits using CMOS (Complementary MOS) FETs, PSPICE modeling of IC MOSFETs.

Prerequisites: EET 245 or EET 237 and CST 262 or instructor consent.

Corequisite: EET 309.

### **EET 309 Introduction to MOS Microelectronics Laboratory**

(0-3-1)

Laboratory companion to EET 308. Theoretical concepts discussed in lecture verified using available components and instrumentation. Computer simulation using PSPICE. Written and oral laboratory reports required.

Prerequisites: EET 246 or EET 238 and CST 262 or instructor consent.

Corequisite: EET 308.

### **EET 319 Fundamentals of Microwave and RF Technology**

(3-0-3)

Introductory topics in the field of microwaves. Transmission lines (wave propagation, losses, reflected waves, and standing waves), Smith Charts, waveguides, microstrip circuits, and s-parameters are covered. Problem solving will use tools such as Smith Charts

and software packages.

Prerequisite: EET 373.

Corequisite: EET 472.

### **EET 340 Optics**

(3-3-4)

A course in geometrical and wave optics. Topics in reflection and refraction at plane and curved surfaces; imaging properties of lenses; paraxial ray tracing of optical systems; superposition; interference; interferometers; diffraction; polarization; scattering.

Prerequisites: MATH 252, PHY 223.

### **EET 358 Senior Project: Individual Project Proposal**

(1-3-2)

Selection, definition, and analysis of a problem suitable for senior project prior to actual project development. Includes consideration of project parameters and implications, proposal of alternate solutions, and justification of selected solution. Culminates in writing of project proposal.

Prerequisites: EET 363, EET 373.

Corequisites: WRI 327, EET Department approval.

### **EET 361 Digital Systems I**

(4-3-5)

State machine design including state reduction and state assignment. Sequential circuit analysis. Digital system implementation using MSI devices such as ROMs and PLDs. Asynchronous state machines analyzed and designed. Computer circuits and memory elements used.

### **EET 362 Digital Systems II**

(4-3-5)

Design digital systems using programmable devices as well as conventional building blocks. System controllers designed using state tables, ASM charts and VHDL. Laboratory explorations and projects of theoretical concepts.

### **EET 363 Introduction to Microcontrollers**

(4-3-5)

A study of Motorola 68HC12 microcontroller. Internal structure, registers, busses, control unit. Clock, machine and instruction cycle timing, interrupts and DMA. Instruction set, mnemonics, functions and assembly language programming. Interfacing to external memory and I/O on chip peripherals. Laboratory explorations and projects of theoretical concepts.

### **EET 364 Microcontroller Systems**

(4-3-5)

Advanced features of Motorola 68HC12 Micro-controller System environment with the external memory and peripheral devices. Advanced numerical routines. Digital control systems, displays, transducers. Laboratory explorations and projects of theoretical concepts.

### **EET 371 LaPlace Transforms and Applications**

(4-3-5)

Applications of LaPlace in first and second order networks; poles, zeros and stability in S-plane; active filters and oscillators. Laboratory explorations and projects of theoretical concepts.

### **EET 373 Operational Amplifiers and Applications**

(4-3-5)

Properties, modeling and analysis of feedback systems using the operational amplifier. Stability and frequency compensation of operational amplifiers. Oscillators, nonlinear circuit applications, Schmitt trigger, analog switches, peak detectors and sample and hold. A/D and D/A conversion techniques. Laboratory explorations and projects of theoretical concepts.

### **EET 405 Reading and Conference**

(Hours to be arranged each term.)

### **EET 408 Workshop**

(Hours to be arranged each term.)

### **EET 413 Data Communications**

(3-0-3)

Principles and techniques of analog to digital conversion; encoding digital data; fundamentals of transmission media; error detection and correction; transmission protocols; multiplexing techniques; time, frequency and code division multiplexing; switching concepts: packet switching, frame relay and asynchronous transfer mode.

Prerequisite: Senior standing in EET.

### **EET 415 Telecommunications I**

(2-3-3)

Introduction to telecommunications. Electromagnetic wave propagation in free space, antennas, line of sight transmission (directive gain, beam width, polarization, impedance), RF components (amplifiers, mixers, up-converters), receivers, and transmitters.

Laboratory assignments and demonstrations include antenna gain and field strength.  
Prerequisite: EET 319.

### **EET 416 Microwave and RF Amplifier Design**

(3-0-3)

An introduction to the design of amplifiers in the frequency range of one half to ten gigahertz. Impedance matching, modeling, dynamic range, unilateral design, bilateral design, stability, low noise design, and broadband design techniques. Students will use software to perform impedance matching, Smith chart plotting, and simulation.  
Prerequisite: EET 415.

### **EET 421 Active Filter Design**

(3-0-3)

An introduction to the design and analysis of active filters including Butterworth, Chebyshev, Bessel, and Elliptic filters. Low-pass through band-pass filters are covered. The course includes one hardware and one software project.

Prerequisite: EET 371.

Corequisite: EET 373.

### **EET 423 ASIC Design I Senior Project**

(2-3-3)

An introduction to various aspects of the design of an ASIC (Application Specific Integrated Circuit) and to new industry trends both in digital and analog design. Laboratory demonstrations and experiments with a complete EDA (Electronics Design Automation) software package. Senior project proposal required.

Prerequisites: EET 361 and EET 373.

Pre- or corequisites: EET 464 and EET 473.

### **EET 425 Telecommunications II**

(2-3-3)

Baseband digital systems; messages, characters and symbols; review of sampling theorems and discrete vs continuous signals; noise sources in digital communications system; M-ary signals; baseband formatting including PCM waveforms; digital filters, including FIR and IIR, raised cosine filters, matched filters; bandpass modulation and demodulation techniques; spectrum transmission.

Prerequisite: EET 415.

### **EET 433 ASIC Design II Senior Project**

(1-6-3)

Advanced topics in ASIC design: behavioral description languages, timing in digital design, design for testability, fault simulation. Field Programmable Logic Devices (FPGA). Simulation and prototyping of the senior project with FPGAs. Senior project report required.

Prerequisite: EET 423.

### **EET 435 Telecommunications III**

(0-9-3)

A capstone course in telecommunications. Students will propose, design and construct/simulate a solution to some telecommunications problem or issue. The student will research vendor data books, application notes, articles and texts to support the design of a telecommunications related circuit, module, or system. A final paper will be written and presented to a faculty board.

Prerequisites: EET 415, EET 425, EET 455.

### **EET 436 Optoelectronic Devices**

(3-3-4)

An introduction to devices commonly used in opto-electronics. Devices and instruments studied include photodiodes, polarizers, retarders, filters, modulators, monochromators, integrating spheres and lock-in amplifiers.

Prerequisite: EET 373.

### **EET 437 Optical Detection**

(3-3-4)

Propagation of optical radiation through optical systems. UV and visible optical detectors including photovoltaic and photoconductive detectors, pyroelectric detectors, linear and area arrays. Noise in photo detectors. Post detection electronic amplifiers and filters.

Prerequisites: EET 436, MATH 254N.

### **EET 443 ASIC Design III Senior Project**

(0-9-3)

Completion of an integrated circuit design. Creation of an IC prototype in FPGA or/and a file for fabrication in silicon. Final report containing project documentation required.

Prerequisite: EET 433.

### **EET 445 Optical Fibers**

(3-3-4)

Theory and practice of light propagation in optical fibers, light sources, types of optical fiber, optical detectors. Termination, coupling

and splicing of optical fibers.

Prerequisites: EET 436, MATH 254N.

### **EET 447 Topics in Optoelectronics**

(0-3-1)

A course designed to give the student additional capabilities with a variety of optics systems and instrumentation. Possible topics include large optics, optical arrays, Fresnel optics, interferometers, spectrometers, thin films and coatings, polarization. All topics to be investigated in a lab setting.

Pre- or corequisite: EET 436

### **EET 454 Automated Test Engineering I**

(2-3-3)

An introduction to Automated Test Engineering (ATE). Topics include: measurement techniques for ATE instruments, measurement errors, and software used to control automated instruments. The IEEE-488 bus is also discussed. Students will complete a group term project.

Prerequisites: CST 116, EET 363, EET 373.

### **EET 455 Digital System Design**

(3-0-3)

Use of register-transfer-language (RTL) notation to describe digital systems. Design of virtual machine, instruction set, random and micro-programmed control units for a typical digital computer. Design of a floating point coprocessor. Description of advanced architecture concepts, multiprocessors, cache memory, pipe-line virtual machines.

Prerequisite: EET 364.

### **EET 458 Senior Project: Individual Project Design**

(1-3-2)

A continuation of EET 358 with emphasis on manufacturer and vendor contact resulting in verification and implementation of proposal trade offs in support of prototype design and construction. Prototype construction of project solution begins. Report produced on design calculations and functional analysis of hardware and/or software needed for project solution.

Prerequisite: EET 358, WRI 327.

### **EET 459 Digital Signal Processing II Senior Project**

(3-0-3)

Analysis and synthesis of digital signal processing systems including the following topics: non-recursive and recursive filters;

hardware accelerators; digital speech processing. Most of the homework will be done using special applications software running on PC based work stations. DSP project proposal.  
Prerequisite: EET 471.

### **EET 461 Optoelectronic Principles** (3-0-3)

A course to investigate the physics associated with a variety of commonly used optical devices. Solid-state physics required to understand function of optical devices such as detectors, solid-state lasers, and optical modulators. Quantum aspects of optics leading to the understanding of photo-emissive devices, optical radiation and laser dynamics.  
Prerequisites: MATH 254N, PHY 223.

### **EET 462 Lasers** (3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, Boltzmann statistics, pumping rate, power gain, threshold conditions, resonator stability, beam shape, mode structure, beam modification with intracavity elements.  
Prerequisite: EET 461.

### **EET 463 Quality Assurance and Reliability** (3-0-3)

Inspection and testing for quality control of electronic circuits and systems. Statistical evaluation of mean-time-between-failure. Sampling plans, analysis of variance, evaluation of reliability. Device and system test objectives and schemes. Case studies in quality control.  
Prerequisites: Senior standing, MATH 254N.

### **EET 464 Automated Test Engineering II** (2-3-3)

A continuation of EET 454. Topics include: measurement techniques and error in digital circuits, IEEE-488 and VXI bus structures, design for test and test error analysis. Course includes a group term project.  
Prerequisite: EET 454.

### **EET 465 Optoelectronic Applications** (3-3-4)

A course designed to further the knowledge and capabilities of the optoelectronics student in fields of interest. Possible areas of study include: Optical Testing, Fourier Optics, Holography, Crystal Optics, Laser Systems

and Fiber Optic Systems.  
Prerequisites: EET 462, EET 436, EET 437.

### **EET 467 Modern Control Systems** (3-0-3)

Analysis and application of modern control system theory in selected areas of electronics, industrial process control, and other systems. The phase-lock-loop is analyzed as the introductory example of a control system application. S and Z transforms are developed in control system contexts.  
Prerequisites: EET 373, MATH 321.

### **EET 468 Senior Project: Individual Project Evaluation** (1-12-5)

A project laboratory (continuation of EET 458). Project proposed in EET 358 and designed in EET 458 will be constructed, tested, evaluated and packaged. Complete documentation with performance specifications, functional description, design calculations, test results, schematics, performance graphs, flowcharts, parts lists, wiring diagrams, and photographs become part of the complete senior project final report. The student will defend his/her project before a review panel that will consist of the senior project advisor, another technically qualified panelist and a third person of the student's choice.  
Prerequisite: EET 458, WRI 327.

### **EET 469 Digital Signal Processing III Senior Project** (0-9-3)

Digital Signal Processing senior projects defined in EET 459 will be designed and implemented. The projects will generally include both hardware and software. A final paper will be written and an oral presentation given.  
Prerequisite: EET 459.

### **EET 471 Digital Signal Processing** (4-3-5)

Analysis of discrete systems and signals including the following topics: discrete signals; linear time invariant systems, difference equations, frequency response, Z transforms. Analysis software applied to solutions. Discrete Fourier transforms. Spectral analysis. Laboratory explorations and projects of theoretical concepts.

### **EET 472 Communication Systems** (4-3-5)

Fourier series and transforms. System noise sources and definitions. Amplitude, fre-

quency and phase modulation. Principles of superhetrodyne receivers. Transmitter circuits and phase lock loop. Digital modulation techniques such as FSK, PSK and QPSK. Laboratory explorations and projects of theoretical concepts.

### **EET 473 Analysis and Design of Analog Integrated Circuits** (4-3-5)

The properties, modeling and analysis of bipolar and field effect transistor circuits commonly found in analog integrated circuits. Topics include high frequency effects, multi-stage circuits, active loads, output stages and the design of a complete integrated circuit operational amplifier. Laboratory explorations and projects of theoretical concepts.

### **EET 476 Optoelectronics Senior Project** (1-6-3)

Capstone course in optoelectronics. Students will propose, design and construct an optoelectronics circuit, module or system.  
Prerequisites: EET 447, EET 465.

## **(EMS) Emergency Medical Technology-Paramedic**

### **EMS 107, EMS 207 Seminar** (Hours to be arranged each term.)

### **EMS 115 Introduction to EMS** (3-0-3)

Introduces the fundamentals of an emergency medical services system, history, and professional roles and responsibilities. Discusses medical/legal and ethical issues, research and evidence based practice.

### **EMS 135 Wilderness First Aid** (1-0-1)

Basic First Aid and CPR training for the outdoor adventurer or world traveler. Scenario-based learning using medical equipment improvised for wilderness settings. Course completion earns Wilderness First Aid and CPR certifications meeting the outdoor industry requirements. Customized group courses available.

### **EMS 151 Emergency Medical Technician (EMT) I** (3-6-5)

The first of two courses required for an entry-

level career in emergency medical services. The course introduces students to the EMS system, professional attributes of an EMT, ambulance operations and the basic knowledge and skills of an EMT.

Prerequisites: Current CPR certification.

### **EMS 152 Emergency Medical Technician (EMT) II**

(3-6-5)

The second of two course focuses on the basic recognition and treatment of specific illnesses and injuries. The course includes 16-hours clinical and ambulance experience. Students successfully completing the course are eligible for Oregon and national certification examinations.

Prerequisite: EMS 151.

### **EMS 190 Emergency Medical Technician Externship**

(0-12-4)

EMS field experience with an affiliated transport agency. Students work at a BLS level under the direct supervision on one of the local EMS agency ambulances.

Prerequisites: EMS 152 or Oregon EMT certification.

### **EMS 200 Medical Terminology**

(3-0-3)

Students build a strong medical vocabulary using prefixes, suffixes, and Greek and Latin verbs and adjectives. Students learn anatomical roots and examine anatomical structures, disease, procedures, tumors, and descriptive terms using simple word analysis.

### **EMS 211 Prehospital Emergency Pharmacology**

(3-0-3)

Lectures relating specific emergencies to the types of medications used for treatment. Includes classifications, actions, indications, administration and dosages, precautions and side effects of each of the medications used in prehospital treatment of medical and traumatic emergencies. In addition, students learn common prescription medications found in the home.

Prerequisite: CHE 210.

### **EMS 218 Trauma Emergencies**

(3-0-3)

Introduces the epidemiology and kinematics of trauma, and integrates the assessment findings with pathophysiology in the management of the acutely injured patient. Discusses considerations for special patient populations

and includes a Prehospital Trauma Life Support certification course.

### **EMS 231 Medical Emergencies I**

(4-0-4)

The first in a series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.

### **EMS 232 Medical Emergencies II**

(3-0-3)

A continuation of the series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.

Prerequisite: EMS 231.

### **EMS 233 Medical Emergencies III**

(3-0-3)

The conclusion of the sequence in medical emergencies where the epidemiology, pathophysiology and assessment findings are integrated to form a treatments plan for acute illnesses in the emergency setting.

Prerequisite: EMS 232.

### **EMS 235 Basic Electrocardiography**

(2-0-2)

Fundamentals of electrocardiography and interpretation of normal and abnormal ECG patterns. Normal and abnormal wave patterns, presentation and treatment of common cardiac diseases.

### **EMS 236 Advanced Electrocardiography**

(2-0-2)

Building upon basic EKG knowledge, this course advances into 12-lead EKG interpretation and prehospital treatment. Focusing on signs and symptoms of ischemia or infarction, axis deviation, and other EKG anomalies, students learn about various treatment modalities.

### **EMS 241 Paramedic Crisis Resource Management I**

(3-3-4)

The first in a series of 3 courses addressing human factors contribution to EMS scene management. PCRM I focuses on human error, perception modalities, human emotion and motivation, and teamwork theory.

### **EMS 242 Paramedic Crises Resource Management II**

(1-0-1)

The second class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRM 2 focuses on the following human factor contributions to scene performance; review of acute healthcare environment challenges, cognitive attention, and crisis communication strategies.

Prerequisite EMS 241.

### **EMS 243 Paramedic Crises Resource Management III**

(1-0-1)

The third class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRM III focuses on the following human factor contributions to scene performance; stress and coping on decision-making, on-scene leadership characteristics, and organizational influences on error.

Prerequisite: EMS 242

### **EMS 271 Paramedic Skills Laboratory Part I**

(0-9-3)

The first of three courses reviews EMT level skills and introduces the advanced level paramedic skills. Students learn safe and effective skills performance and begin to integrate assessment, management and skills performance.

### **EMS 272 Paramedic Skills Laboratory Part I**

(0-6-2)

The second course in the series continues the development of advanced level skills proficiency. Students integrates knowledge of specific patient complaints with assessment and management skills.

Prerequisite: EMS 271.

### **EMS 273 Paramedic Skills Laboratory Part I**

(0-6-2)

The third course in the series of advanced level skills development. Students demonstrate proficiency and prepare for paramedic licensing examinations.

Prerequisite: EMS 272.

### **EMS 283 Clinical Practicum I**

(0-18-6)

Focusing on the emergency medical practices of a paramedic, students integrate classroom

studies into clinical practices while working under the direct supervision of health care professionals.

Prerequisites: CHE 210, EMS 218, EMS 231, EMS 235, EMS 241, EMS 271.

### **EMS 284 Clinical Practicum II**

(0-18-6)

Students integrate knowledge and skills with patient care practices as they rotate through clinical experience in a variety of medical specialties. Students work under the direct supervision of health care professionals in each medical specialty.

Prerequisites: CHE 210, EMS 218, EMS 231, EMS 235, EMS 241, EMS 271.

### **EMS 291 Paramedic Field Externship Practicum I**

(0-12-4)

The first of two field experience courses with an affiliated advanced life support agency. Students complete an orientation to the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.

### **EMS 292 Paramedic Field Externship Practicum II**

(0-36-12)

The continuation of the field experience courses with an affiliated advanced life support agency. Students work in the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.

Prerequisites: EMS 291

## **(ENG) English**

### **ENG 104, ENG 105, ENG 106 Introduction to Literature**

(3-0-3) H

Literature and the nature of literary experience through reading of prose and poetry drawn from American and other literatures. Works representing principal literary types are read in their entirety when possible, with emphasis on such elements as structure, style, characterization, imagery, and symbolism.

### **ENG 107, ENG 207, ENG 307, ENG 407 Seminar**

(Hours to be arranged each term.) H or HP

### **ENG 235 American Multicultural Literature**

(3-0-3) H

An introductory study of short stories,

poetry, essays, and a novel that illustrates the diversity of North American culture.

### **ENG 246 Creative Writing**

(3-0-3) H

Examines the elements, structures and traditions of fiction writing through readings, discussions, and creative writing exercises. For students interested in writing fiction.

Prerequisite: WRI 122.

### **ENG 253 American Literature I**

(3-0-3) H

A study of the romantic movement in American literature, 1800-1860, including the works of Irving, Emerson, Melville, Thoreau, Poe, Hawthorne, and Whitman.

### **ENG 254 American Literature II**

(3-0-3) H

A study of the realistic movement in American literature, 1860-1916, including the works of Dickinson, Howells, James, Cather, Crane, and Twain.

### **ENG 255 American Literature III**

(3-0-3) H

A study of the major writers and movements in American literature from World War I to the present, including the works of Hughes, Faulkner, Steinbeck, Plath, Silko, Bartheleme, and Carver.

### **ENG 266 Native American Literature and Film**

(3-0-3) H

Explores connections to the human condition found in literature and stories authored by Native Americans with focus on a variety of themes including assimilation, ethnicity, survival and stereotyping. Documentary films and commercial cinema support and lend context to the readings. Students are encouraged to define and/or redefine their worldviews.

### **ENG 367 Art and Trash in Contemporary Fiction**

(3-0-3) H

In-depth study of contemporary fiction, finding meaning in literature responsive to the human condition and relevant to the reader. Includes works from authors such as Margaret Atwood, Tim O'Brien, Alice Munro and Anthony Doerr.

Prerequisite: WRI 122.

### **ENG 373 British Culture and Literature: Romanticism to the Present**

(3-0-3) H

Explores features of culture and selected works and writers from the Nineteenth and Twentieth Centuries in Britain. Some film presentation included.

### **ENG 381 Contemporary World Literature**

(3-0-3) H

An in-depth study of selected writers and works organized thematically, geographically, and ethnically. The focus on contemporary works provides insight into current world cultures and explores globalization while encouraging students to critically examine their worldviews.

Prerequisite: WRI 122.

### **ENG 456 Topics in Film**

(3-0-3) H

Examines films as stories using modern literary criticism techniques. Offerings include close analysis of contemporary film, selected directors, selected genres and surveys of film history.

Prerequisites: 3 credits of English or Humanities and WRI 121.

## **(ENGR) Engineering**

### **ENGR 101 Introduction to Engineering I**

(1-3-2)

Introduces the student to engineering with a focus on academic success, professional development, ethics, communication, creative problem solving techniques, engineering tools (CAD/CAE), and design concepts. A discipline-specific team-based laboratory experience encourages consideration of a chosen engineering discipline.

### **ENGR 102 Introduction to Engineering II**

(1-3-2)

The student will focus on their chosen discipline through an interdisciplinary team-based design project including problem identification, measurement, analysis and presentation to peers. Emphasis will be placed on proper usage of engineering tools and instruments and sound design practices.

Prerequisite: ENGR 101.



**ENGR 207 Seminar**

(Hours to be arranged each term.)

**ENGR 211 Engineering Mechanics: Statics**

(4-0-4)

Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems.

Pre- or corequisite: MATH 252.

Prerequisite: PHY 201 or PHY 221.

**ENGR 212 Engineering Mechanics: Dynamics**

(3-0-3)

Kinematics of particles and rigid bodies.

Kinetics of particles and rigid bodies in plane motion, including Newton's second law, work and energy, and impulse and momentum.

Prerequisites: ENGR 211, MATH 252.

**ENGR 213 Engineering Mechanics: Strength of Materials**

(3-3-4)

Internal stresses and deformations of structural members and machines when subjected to external forces.

Prerequisite: ENGR 211.

**ENGR 236 Fundamentals of Electric Circuits**

(3-0-3)

Resistive circuits, operational amplifiers, capacitors, inductors, transient analysis, sine waves, AC circuit analysis, resonance, transformers. Not for Electronics Engineering Technology and Computer Engineering Technology students.

Prerequisites: MATH 251, PHY 202/222.

**ENGR 266 Computer Programming for Engineers**

(2-3-3)

Programming and problem solving using current computer software. General programming techniques using conditional statements, looping, subroutines, and data input/output will be stressed. Consideration of features specific to the software being used will also be presented.

Prerequisite: MATH 111.

**ENGR 267 Engineering Programming**

(2-3-3)

Computer programming principles. Control structures. Structural programming principles. Functions and scripts. MATLAB

programming. LabVIEW programming. Application of engineering programming principles in projects.

Prerequisite: MATH 251.

**ENGR 318 Engineering Mechanics: Fluids**

(3-3-4)

Fundamental properties of fluids, fluid statics and pressure variation, flow characterization, momentum and forces due to fluid motion, energy of fluids in motion, and flow in conduits. Emphasis on civil and mechanical engineering applications of fluid mechanics principles.

Prerequisites: ENGR 211 and MATH 252.

**ENGR 355 Thermodynamics**

(3-0-3)

An introductory course in thermodynamics, the science of heat energy conversion. Develops understanding of energy, heat, work, efficiency, and ideal thermodynamic cycles. Teaches first and second laws of thermodynamics and perfect gas law.

Prerequisites: MATH 252; PHY 202 or PHY 222.

**ENGR 407 Seminar**

(Hours to be arranged each term.)

**ENGR 445 Engineering Project Management**

(3-0-3)

Applications of the Critical Path Method to organization and control of engineering projects. Applications software will be used to create and evaluate project networks to develop management reports.

Prerequisites: Junior standing in Engineering or Engineering Technology.

**ENGR 465 Capstone Project**

(0-6-2)

Students apply material learned in other courses, develop expertise on a specific topic, work closely with a faculty member to implement the project and improve professional communication skills by writing a project report. Course may be repeated for credit.

Prerequisites: Junior standing and instructor permission.

**ENGR 485 Fundamentals of Engineering Exam**

(1-0-1)

Students are required to take the Fundamentals of Engineering Exam offered by the Or-

egon State Board of Examiners for Engineering and Land Surveying, or other state board with prior approval of program director.

Prerequisite: Graduating Senior.

**(ENGT) Engineering Technology****ENGT 101 Engineering Technology Techniques**

(2-6-4)

Engineering terminology and problem solving tools including computer aided drafting, technical sketching, word processing, spread sheets, multiview projections, significant figures, and engineering problem solving techniques.

Prerequisite: MATH 100.

**ENGT 103 Engineering Terminology**

(3-2-4)

Terminology, symbols, and units commonly used in the engineering field. Interpretation and reproduction techniques of engineering drawings and graphs. A brief overview of the field of civil engineering. This course is designed primarily for the Office Systems Technology program.

**ENGT 104 Electrical and Electronic Nomenclature and Symbols**

(3-0-3)

A survey course in basic electricity and electronics, emphasizing terminology and nomenclature. This course is designed primarily for the Office Systems Technology program.

**ENGT 107, ENGT 207, ENGT 307, ENGT 407 Seminar**

(Hours to be arranged each term.)

**ENGT 230 Statics**

(3-0-3)

Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems

Corequisite: MATH 112.

**ENGT 231 Strength of Materials**

(3-0-3)

Internal stresses, deflections, and deformations of structural members and machines when subjected to external forces.

Prerequisite: ENGT 230 or ENGR 211.

**ENGT 232 Advanced Strength of Materials**

(2-3-3)

Internal stresses, deflections, and deformations of structural members and machines when subjected to external forces. Column buckling, 3-D stress states, and failure criteria.

Prerequisite: ENGT 231.

**ENGT 310 Introduction to Geothermal Energy**

(3-0-3)

Overview of geothermal energy: distribution, geology, hydrology, and geochemistry; exploration and extraction techniques; uses including power generation, space heating, agriculture, process and multistage utilization; and environmental, economic, and legal considerations. Field trips to local sites.

**ENGT 311 Passive Solar and Solar Cell Design**

(3-0-3)

Residential passive solar heating and super-insulation construction techniques including heat load calculations using the Balcomb SHF method. Technical and economic analysis of solar electric cells, storage batteries, and inverter technology.

Prerequisite: PHY 202 or instructor consent.

**ENGT 312 Critical Path Techniques**

(1-3-2)

Scheduling techniques used by management on engineering and industrial projects. The course will concentrate on the Critical Path Method (CPM), but will also include comparisons with Gantt charts and Program Evaluation Review Technique (PERT). Concepts will be applied to mini-projects in class and expanded through the use of selected computer software packages.

**ENGT 370 Introduction to Automation and Robotics**

(2-3-3)

A survey of automation and all areas of robotics with an emphasis on the industrial robot. It will include history, terminology, use, future, impact on society, and hands-on laboratories.

Prerequisites: MATH 112, a programming course.

**ENGT 390, 490 Co-op Field Practice**

(Variable Credit)

An approved work program related to the student's field of specialization for a continu-

ous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's Engineering Technology Department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence.

**ENGT 391, 491 Co-op Field Practice**

(Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month period.

**ENGT 415 Occupational Safety**

(2-3-3)

Topics include current occupational safety and health issues. Practical application of regulations in the industrial setting. Compliance to Industrial Hygiene and General Safety Standards. Common safety violations and implementation of safety programs.

Prerequisite: Junior standing in MFG.

**ENGT 471 Microprocessor Application in Automation and Robotics**

(2-3-3)

This is an applied course in using microprocessors to support controlling motion, such as in robotic manipulators and automated equipment and interfacing sensor inputs.

Prerequisites: CST 331 and ENGT 370.

**ENGT 500 Research Methods**

(3-0-3)

Study of industrial analytical techniques used to develop new technologies, including the use of computer aided engineering systems and software for design purposes. Examination of research and development methods, current industrial practices and applications of new technologies.

**ENGT 507 Seminar**

(Hours to be arranged each term.)

In-depth examination of current theories, research, trends and processes of industry. Individual study, information exchange, and research of selected industrial topics.

**ENGT 518 Data Communications**

(3-3-4)

Data communications and computer network protocols, hardware elements, and software algorithms. Error handling, routing, flow

control, host-to-host communications, and local area networks.

**ENGT 521 ASIC Design I**

(3-3-4)

Techniques for designing Application Specific Integrated Circuits (ASICs). Comprehensive study of computer concepts using computer aided design tools. Implementation of ASIC devices in digital computing systems including: modeling (using VHDL), digital synthesis, place and routing functions, and layout. Design exercises accomplished using hardware description languages and simulation.

Prerequisite: VLSI or ASIC coursework or experience.

**ENGT 522 ASIC Design II**

(3-3-4)

Techniques used to transform hardware description language-based designs to physical layout. Applications of synthesis tools for floor planning and layout of Application Specific Integrated Circuits. Comprehensive study of logic design, layout generated design, and advanced CMOS circuit techniques used when designing with standard cells.

Prerequisite: ENGT 521.

**ENGT 523 Advanced ASIC Design**

(3-3-4)

Introduction to very large scale integration (VLSI) technology and design of CMOS integrated circuits including: the device fabrication process and design rules as they apply to device layout. Analysis, design, simulation and layout rules presented. Logic gates and function design, simulation and physical layout.

Prerequisite: ENGT 522.

**ENGT 545 Advanced Microcomputers**

(3-3-4)

Microprocessor technology and its application to the design of practical digital computing systems. Design techniques used to develop and design newer generation microprocessor-based computing systems. Assembly language programming and interfacing of microprocessor-based systems.

Prerequisite: Microprocessor coursework or experience.

**ENGT 546 Advanced Computer Architectures**

(3-3-4)

Advanced topics in computer architectures

including design of computer hardware, organizational structures, and architectural properties of parallel, vector and multiprocessor systems. Computer organizational structures of memory and I/O subsystems, multiprocessor computer architectures, and data flow computers.

Prerequisite: Course work or experience in computer architecture and organization.

### **ENGT 565 Semiconductor Device Physics and Processes**

(3-0-3)

Simple models and physical insight to solid state physics. Crystal structure and symmetry, crystal lattices, reciprocal lattices, equilibrium and nonequilibrium processes in semiconductors. Thermal properties, energy band, and semiconductor properties.

### **ENGT 581 Master's Project I**

(1-9-4)

Students prepare the proposal for the Master's project under the guidance of a project advisor. Project proposal guidelines and accepted format presented. Approval of the proposal by the student's project committee constitutes completion of the course.

### **ENGT 582 Master's Project II**

(1-9-4)

Students complete task specified by the project advisor. Preliminary results of the student's project presented to the student's project committee. Acceptance of these results constitutes completion of the course. Prerequisite: ENGT 581.

### **ENGT 583 Master's Project III**

(1-9-4)

Students produce the final report demonstrating the completion of the project. Final results of the student's Master's project presented to the student's project committee. Acceptance of the report by the student's project committee constitutes completion of the course.

Prerequisite: ENGT 582.

## **(ENV) Environmental Sciences**

### **ENV 107, ENV 207, ENV 307, ENV 407 Seminar**

(Hours to be arranged each term.)

Prerequisite: ENV major or instructor consent.

### **ENV 112 Environmental Social Sciences**

(2-0-2)

An introduction to the integration of science, social systems, environmental policy, and sustainability focusing on types of data, sampling techniques, and statistical methods used by social scientists. Emphasis on active learning and case study approaches.

Prerequisites: BIO 111, BIO 112, ECO 201, MATH 111 or instructor consent.

### **ENV 225 Ecological Assessment of Riparian Ecosystems**

(1-3-2)

Introduction to basic principles and practices of riparian ecology. Emphasis on the history and status of contemporary riparian assessment methods, with special focus on grazed rangelands of the Upper Klamath Basin. Lectures supported by field and laboratory exercises.

### **ENV 265 Field Methods in Environmental Sciences**

(1-6-3)

Basic principles of experimental design, site and instrument selection for field research. Basic instrumentation and data acquisition techniques are used to contribute to authentic research programs at different locations alongside environmental science professionals.

### **ENV 314 Environmental Management and Restoration**

(3-0-3)

Overview of legislative, regulatory, and public and private voluntary activities involving the management and restoration of natural ecosystems and their services. Emphasis on the National Environmental Policy, Clean Water, and Endangered Species Acts, with illustrative case studies from local and regional environments.

Prerequisite: WRI 122.

### **ENV 318 Systems Modeling**

(2-3-3)

Computer simulation of dynamic systems. Fundamentals of numerical simulation. Simulation of positive and negative feedback loops. Examination of differing model approaches. Multiple independent variables. Randomness. Application towards ecological systems.

Prerequisite: BIO 213.

### **ENV 325 Environmental Microbiology**

(2-6-4)

Microbial processes with emphasis on soil and water habitats. The impact of microorganisms in health, water and food sanitation, waste disposal, and bioremediation. Microscopy, laboratory, and field techniques for the isolation and identification of microorganisms.

Prerequisites: BIO 213, CHE 223.

### **ENV 336 Environmental Hydrology**

(3-3-4)

Study of the hydrologic cycle; quantitative measurement of precipitation, infiltration, runoff, streamflow and storage in watersheds. Curve fitting, hydrographic analysis, statistical analysis of extreme flows, flood routing and runoff modeling for small and urban watersheds.

Prerequisites: ENV 225, MATH 252, MATH 361.

### **ENV 365 Advanced Field Methods in Environmental Sciences**

(1-6-3)

Advanced principles of experimental design, site and instrument selection for field research. Advanced instrumentation and data acquisition techniques are used as part of authentic research programs at different locations alongside environmental science professionals. Course may be repeated for credit.

Prerequisites: MATH 112 and WRI 122.

### **ENV 427 Greenhouse Gas Accounting/Footprints**

(3-0-3)

Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as REE 427 (cannot be used for graduation credit by students who have taken REE 427).

Prerequisites: Junior or senior standing, MATH 361 and WRI 227.

### **ENV 435 Atmospheric Physics**

(3-3-4)

The physics of transport and diffusion of air pollution. Atmospheric thermodynamics. Mixing heights, plume rise, and fundamentals of atmospheric turbulence. Eulerian and

Lagrangian dispersion models.

Prerequisites: MATH 252, PHY 202 or PHY 222.

### **ENV 466 Integrated Watershed Analysis**

(3-3-4)

Land use hydrology and watershed management practices to improve and maintain water quality. Emphasis on integrated, multi-disciplinary assessment methods.

Prerequisites: CIV 467, ENV 336.

Corequisite: CHE 465.

### **ENV 469 Treatment Wetlands**

(3-0-3)

Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and stormwater treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies.

Prerequisites: CHE 202, MATH 251.

## **(GEOG) Geography**

### **GEOG 105 Physical Geography:**

#### **Geomorphology**

(3-0-3) SS

Landforms and geomorphological processes, including tectonics, erosion and weathering and biological influences. Satisfies Science elective.

### **GEOG 106 Cultural Geography I**

(3-0-3) SS

Cultural geography of the major world developed regions other than the United States – Europe, Australia and New Zealand, the former Soviet Union, Canada and Japan. The course emphasizes the regional approach.

### **GEOG 107 Cultural Geography II**

(3-0-3) SS

Cultural geography of the world's underdeveloped realms –the countries of Middle and South Americas, Africa and Asia. The course emphasizes the regional approach.

### **GEOG 108 Cultural Geography III**

(3-0-3) SS

An introduction to cultural geography of selected world realms, namely The Middle East, South Asia, East Asia, Southeast Asia, and The Pacific Realm. Cultural imprints on the physical landscape will be discussed and regional approach emphasized.

### **GEOG 115 Physical Geography:**

#### **Climatology**

(3-3-4) SS

Weather and climate: atmospheric pressure, wind, moisture, global climate patterns, glacial processes and the hydrosphere. Analysis of weather data, satellite tracking of storms and construction of climatographs. Satisfies lab science.

### **GEOG 207, 307, 407 Seminar**

(Hours to be arranged each term.) SS

## **(GEOL) Geology**

### **GEOL 107, GEOL 207, GEOL 307,**

#### **GEOL 407 Seminar**

(Hours to be arranged each term.)

### **GEOL 201 Physical Geology**

(3-3-4)

A brief systematic description of the major rock-forming minerals and the three major rock groups. The events of erosion, transportation and deposition of chemically altered and physically fragmented rocks and the resulting sculpturing of the earth's surface are discussed.

## **(GIS) Geographic Information Systems**

### **GIS 103 The Digital Earth**

(1-3-2)

Introduction of how present day information systems attempt to represent the features and attributes of our natural world in digital form. Examination of how these systems can be used to portray and solve geospatial problems. Introduction to the concept, vocabulary, and use of GIS. Introduction to the use of various 'free-ware' software applications used for geospatial analysis.

### **GIS 105 Map and Compass/GPS**

(0-3-1)

Instruction in the practical use of a topographic map, compass, and hand-held GPS unit. Map scale, resolution, and accuracy. Projections and coordinate systems. Integrating the use of a map and compass. Introduction to the theory and operation of recreational-grade GPS units.

### **GIS 107, GIS 207, GIS 307, GIS 407 Seminar**

(Hours to be arranged each term.)

### **GIS 205 GIS Data Integration**

(1-3-2)

Construction and use of a data dictionary. Differential Correction. Importing feature and non-feature data into a GIS. Data Conversion. Use of hand-held GPS/GIS units. Use of web-based data sharing techniques. Introduction to use of ArcPad® software. Prerequisites: GIS 105 and GME 134.

### **GIS 306 Geospatial Raster Analysis**

(3-3-4)

Manipulation and storage of raster data. Measurement scales. Map algebra. Georeferencing raster datasets. Least-cost path and corridor modeling techniques. Distance, surface and density mapping techniques. Use of local, focal, block, and zonal statistical functions. Viewshed and hydrologic analyses. Prerequisite: GME 134.

### **GIS 316 Geospatial Vector Analysis I**

(3-3-4)

Coordinates, datums, projections. Advanced editing and annotation techniques. Use of subtypes and domains. Map and geodatabase topology. Overlay and proximity analysis. Linear referencing and dynamic segmentation. Introduction to ModelBuilder® software. Professional map creation skills. GIS project design fundamentals. Prerequisite: GME 134.

### **GIS 332 Customizing the GIS Environment I**

(3-3-4)

Geoprocessing in ArcGIS® with Python. Working with lists, tuples, and dictionaries. Manipulating strings. Branching. Use of cursors to access spatial and non-spatial data. Enhancing ModelBuilder® with scripting. Tool creation. Prerequisites: GIS 134 and MIS 118.

### **GIS 426 Geospatial Vector Analysis II**

(3-3-4)

Geocoding. Advanced techniques for geospatial analysis. Spatial adjustment techniques. Use and creation of directed and undirected networks for geospatial analysis. Quantitative assessment of geographic patterns and distributions. Use of automated geoprocessing techniques.

Prerequisite: GIS 316.

### **GIS 432 Customizing the GIS Environment II**

(3-3-4)

Creation and use of forms for managing data input/display. Navigation of ArcGIS UML diagrams for the creation of customized functionality. Creation and management of Add-Ins. Building and deploying stand-alone GIS applications. Use of JavaScript for creating web applications.  
Prerequisite: GIS 332.

### **GIS 446 GIS Database Development**

(3-3-4)

Advanced geodatabase design. Study, use and creation of data models. Extensive use of relationship classes and validation rules. Students will apply skills towards the solution of various geospatial database scenarios.  
Prerequisites: GIS 426 and MIS 275.

### **GIS 456 GIS Management**

(3-0-3)

Discussion of how to implement a GIS of any scope. Role of information products in implementation process. Creation of a data design. Selection of an appropriate data model. Hardware, software and personal requirements.  
Prerequisites: GIS 426 and GIS 446.

### **GIS 468 GIS Practicum**

(Hours to be arranged each term.)

## **(GME) Geomatics**

### **GME 107, GME 207, GME 307, GME 407 Seminar**

(Hours to be arranged each term.)

### **GME 134 Geographic Information Systems**

(1-6-3)

Use of vector data, editing and querying of spatial and attribute data. Relating spatial and attribute data. Introduction to elements of map design. Shapefile-KML and CAD-GIS data conversion. Use of raster data, analyzing raster surfaces. Introduction to map algebra. Extensive use of ArcGIS™ software.  
Prerequisite: CE 203 or GIS 103.

### **GME 161 Plane Surveying I**

(3-3-4)

Fundamental concepts of plane surveying including theory of measurements, systematic and random errors. Distance and angle measurement using total stations and differential

leveling. Calculation of bearings, azimuths, coordinates, area and traverse adjustments. Introduction to horizontal and vertical curve computations.  
Corequisite: MATH 111.

### **GME 162 Plane Surveying II**

(2-6-4)

Digital theodolites and data collectors, instrument testing and observational error analysis. Theory of leveling. Solar observation and computation. E.D.M. use and calibration. Field labs including solar observations, traversing, leveling and horizontal curve layout. Introduction to COGO software.  
Prerequisites: GME 161, MATH 112.

### **GME 163 Route Surveying**

(2-9-5)

Laboratory intensive project overview including horizontal and vertical control for preliminary location and construction surveys for a secondary road. Instruction in basic elements of horizontal and vertical route alignment and layout. Determination of earthwork quantities. CAD drafting of plan, profile and cross-sections.  
Prerequisites: GME 162, GME 175, both with grade "C" or better.

### **GME 175 Computations and Platting**

(2-6-4)

Coordinate geometry concepts with emphasis on manual solutions to standard surveying computations. Introduction to HP calculator use and programming. Introduction to map composition and platting using industry standard software.  
Prerequisite: GME 161. Corequisite: CE 203.

### **GME 241 Boundary Law I**

(3-0-3)

Statute law, common law, and legal principles relating to land boundaries. Each student will be required to use the county law library to research assigned cases.  
Prerequisites: GME 161, WRI 121 or instructor consent.

### **GME 242 Land Descriptions and Cadastre**

(3-0-3)

Real property descriptions and land record systems. Emphasis on interpreting and writing land descriptions, and introduction to researching records in various Land Informa-

tion Systems.

Prerequisites: GME 161, GME 241, both with grade "C" or better.

### **GME 264 Digital Design for Surveying**

(0-6-2)

Use of Carlson software to solve and plot assignments covering traverse calculations, horizontal and vertical curve alignments, profiles and earthwork volumes. Hand calculations will be made to supplement the computer solutions.  
Prerequisites: CE 203, GME 163 with grade "C" or better.

### **GME 297 Seminar**

(Hours to be arranged each term.)

### **GME 299 Independent Studies**

(Hour to be arranged each term.)

### **GME 324 Geomatics Computer Programming**

(1-6-3)

Students develop Visual Basic programs and Excel spreadsheets to solve geomatics problems. Extensive use of Excel spreadsheets including developing custom functions and VBA extensions. Students are introduced to MS Access relational database, and develop a functioning geomatics database.  
Prerequisites: GME 264, MIS 115.

### **GME 343 Boundary Surveys**

(2-6-4)

Planning, organizing, calculating and applying field procedures for boundary and cadastral surveys. Writing deed descriptions; researching public record systems relative to property boundaries.  
Prerequisites: GME 163, GME 242, both with grade "C" or better.

### **GME 351 Construction and Engineering Surveying**

(2-6-4)

Organizing, planning and estimating costs for construction and engineering surveying projects. Field projects related to construction, layout of engineering works and site mapping.  
Prerequisites: GME 163, GME 264.

### **GME 355 Digital Photogrammetry**

(2-3-3)

Introduction to Photogrammetry, topics include geometry of the vertical image, the

stereo pair, and parallax computations. Aerial triangulation of image blocks, and project planning and mission design. Students use Softcopy workstations to compile topographic maps.

Prerequisites: GME 264, MATH 252.

### **GME 372 Subdivision Planning and Platting**

(2-6-4)

Land use planning; governmental regulations as applied to subdivisions; subdivision planning, computations and preparation of subdivision plats.

Prerequisites: GME 242, GME 264, both with grade "C" or better.

### **GME 381 Advanced Cadastral Surveying I**

(2-0-2)

History of United States land surveying and pertinent boundary law. Introduction to records research and boundary law principles; analysis of legal descriptions in deeds and other documents that transfer land title.

Course utilizes BLM CFedS materials.

Prerequisite: Instructor permission, ability to perform standard surveying computations, an understanding of boundary law.

### **GME 395, GME 495 Cooperative Field Experience**

(0-40-4)

An approved work program related to geomatics practice involving full-time meaningful activity. The employer, type of work and level of difficulty must be approved by the Geomatics Co-op Coordinator prior to the work period. Progress reports are prepared by the student during the work period and submitted for review. A comprehensive written report is required at the end of each co-op period. A co-op period may be three months for 2 credits or six months for 4 credits. A tuition fee is required for credits earned by co-op work experience.

Prerequisites: Completed freshman year and two terms residence.

### **GME 396, GME 496 Cooperative Field Practice**

(0-40-2)

Three month, two credit hour version of GME 395 and GME 495.

### **GME 415 Advanced Road Design**

(2-6-4)

Complete road design project including "L" and "P" line locations; horizontal and verti-

cal curve calculations with consideration of stopping and sight distances; earthwork and mass diagram calculations; drainage and road construction materials.

Prerequisite: GME 351.

### **GME 425 Remote Sensing**

(3-3-4)

Topics in remote sensing and photogrammetry including an introduction to classic digital image processing techniques. Digital surface modeling using terrestrial and aerial LiDAR, and semi-global matching image processing. Students use softcopy image processing software.

Prerequisites: MATH 252, PHY 222.

### **GME 434 Advanced Geographic Information Systems**

(2-6-4)

### **GME 434 Land Administration for Sustainable Land Development**

(2-6-4)

Review and compare land tenure systems in the United States and Foreign countries. Introduction to principles of land administration. Use of geospatial data models for management of parcel data and use of ArcGIS software for creation of Land Information Systems designed to manage cadastral data.

Prerequisites: GME 134, GIS 316.

Corequisite: GME 452.

### **GME 444 Adjustment by Least Squares**

(3-3-4)

Theory of the least squares method and error propagation; variances and co-variances of observed, derived and adjusted quantities. Modeling of geomatics problems using different techniques of least squares. Linearization and iteration of nonlinear equations. Adjustment validation using hypothesis testing.

Prerequisites: MATH 254N, MATH 361.

### **GME 451 Geodesy**

(4-0-4)

Size and shape of the earth. Geometry of the reference ellipsoid. Spherical, ellipsoidal and local coordinate systems. Coordinate transformations in 2-D and 3-D. Datums and datum conversion. Reduction of field observations to the ellipsoid. The geoid, orthometric heights, and leveling.

Prerequisite: MATH 254N.

### **GME 452 Map Projections**

(2-3-3)

Overview of map projections used in cartography, and conformal map projections used in the geomatics profession. Emphasis on state plane coordinate systems and local map projections. Extensive use of Excel for analysis and computations.

Prerequisite: GME 451 with grade "C" or better.

### **GME 454 GNSS Surveying**

(2-6-4)

Study of the theory and operation of the Global Positioning System and other Global Navigation Satellite Systems. Design of GPS networks in accordance with current standards and specifications. Laboratory exercises introduce the student to a variety of GNSS applications.

Prerequisites: GME 444, GME 451, both with grade "C" or better.

### **GME 455 GNSS Surveying for GIS**

(2-6-4)

Study of the theory and operation of the Global Positioning System and other Global Navigation Satellite Systems. Design of GPS networks in accordance with current standards and specifications. Laboratory exercises introduce the student to a variety of GNSS applications.

Prerequisite: GME 451 with grade "C" or better.

### **GME 466 Boundary Law II**

(2-0-2)

Evidence, professional liability, written and unwritten transfers of land ownership and title interests. A term paper is required of each student.

Prerequisite: GME 343 with grade "C" or better.

Corequisite: WRI 327.

### **GME 468 Geomatics Practicum**

(1-9-4)

Students participate in projects which integrate spatial positioning (GPS, geodesy, adjustments), boundary law, and L/GIS applications. Student teams perform research, establish and adjust a control network, perform field mapping. Students prepare final reports and L/GIS products.

Prerequisites: GME 444, GME 452, GME 454, and GME 466.

**GME 482 Advanced Cadastral Surveying II**

(2-0-2)

Introduction to the complex process of evaluating field evidence and correlating with written records. Various scenarios discuss analysis aspects. Practical advice, legal concepts, and issues involved in evaluating corner evidence. Course utilizes BLM CFedS materials.

Prerequisite: GME 381 with grade "C" or better.

**GME 483 Advanced Cadastral Surveying III**

(2-0-2)

Introduction to water boundaries to create awareness of basic riparian issues. Subdivision of sections addresses normal subdivision lot-closing sections, elongated and fractional sections, and the three-mile method of section subdivision. Course utilizes BLM CFedS materials.

Prerequisite: GME 482 with grade "C" or better.

**GME 497 CFedS**

(4-0-4)

Provides academic credit for licensed professional land surveyors who successfully completed the rigorous BLM Certified Federal Surveyor (CFedS) examination.

Prerequisite: Successful completion of the CFedS examination.

**GME 498 Workshop**

(Hours to be arranged each term.)

**GME 499 Independent Study**

(Hours to be arranged each term.)

**(HED) Health Education****HED 107, HED 207, HED 307, HED 407 Seminar**

(Hours to be arranged each term.)

**HED 240 Emergency Care and CPR**

(2-0-2)

Comprehensive coverage of emergency care for a wide variety of injuries or illnesses. Course content includes artificial respiration and cardiopulmonary resuscitation, wounds, and bleeding; shock; burns; poisonings; bone, joint, and muscle injuries; cold- and heat-related injuries; alcohol and drug emergencies; and methods of transportation. Emphasis on

victim examination, evaluation, and assessment tools and appropriate immediate and temporary care.

**HED 246 Drugs and Alcohol Problems of Modern Society**

(2-0-2)

Physiological and psychological effects of drugs, from caffeine to heroin. A brief study of neurophysiology and pharmacology. Investigation of the major drug classifications. Other topics include alcohol advertising, co-dependency, drug-affected babies, treatment and recovery, and legalization issues.

**HED 250 Contemporary Health Issues**

(2-0-2)

Topics related to the maintenance of a healthy lifestyle. Emphasis on lifestyle choices and behavior patterns that affect one's state of wellness. Topics include stress management; emotional, social, and spiritual well-being; nutrition, fitness and exercise; weight management; cardiovascular disease and cancer risk reduction; addictions; and other lifestyle-related health behaviors.

**HED 260 Diet and Exercise for Lifetime Fitness**

(2-0-2)

Practical concepts of nutrition and exercise, their role in disease risk, obesity, and weight control. Consumer concerns, advertising, fads, gimmicks. Fitness and dietary evaluations.

**(HIST) History****HIST 101, 102, 103 History of Western Civilization**

(3-0-3) SS

Development of Western civilization from early beginning to the present, with attention to political, economic, religious, social, and cultural factors. Courses need not be taken in sequence. HIST 101: From the origins of human civilization to 1000 A.D. HIST 102: From 1000 A.D. to 1789. HIST 103: From 1789 to the present.

**HIST 107, HIST 207, HIST 307, HIST 407 Seminar**

(Hours to be arranged each term.) SS

**HIST 201, 202, 203 U.S. History**

(3-0-3) SS

The historical development of the United States, its economic, political, and social

institutions from the colonial period to the present. Courses need not be taken in sequence. HIST 201: Pre-Columbian and colonial times to 1840. HIST 202: 1840, Westward expansion and the Civil War to 1899. HIST 203: 1900 to present.

**HIST 215 The American Western Experience**

(3-0-3) SS

History of 19th century western America. Native American relations and the influence of the fur trappers, trail blazers, the railroad, the cattle industry and certain religious and ethnic groups on western development.

**HIST 216 American Military History**

(3-0-3) SS

Evolution of the conduct of war in the 20th century as a reflection of social, political, and technological developments. Course employs a case study approach focusing on a particular war of the 20th century. Wars studied may include World War I, World War II, and the Vietnam War.

**HIST 224 Technology and the Ancient World**

(3-0-3) SS

The interaction of technology and world civilization from earliest times to 1500 A.D. Topics include the development of agriculture, urbanization, the place of technology in the Roman and Chinese empires, Medieval engineering, and the technological roots of globalization.

**HIST 225 Technology and the Rise of the West**

(3-0-3) SS

The economic and social roots of Western dominance of the world economy after 1500. Topics include the Trans-Atlantic Exchange, the Industrial Revolution, urbanization, globalization, and the technological roots of colonialism.

**HIST 226 Technology and the Modern World**

(3-0-3) SS

The interaction of technological change and world civilization in the 20th century. Topics include the role of corporations in technological change, the theory of Large Technological Systems (LTS), Cold War science and technology, and origins of the internet.

**HIST 245 Hitler and the Holocaust**

(3-0-3) SS

Introduction to the history of the Holocaust, with a focus on the role of Adolph Hitler. Topics include Hitler's life and political career, the social, technological and economic structure of the Holocaust, and Hitler and the Holocaust in popular culture.

**HIST 335 The Engineering Profession**

(3-0-3) SS

The emergence and development of the engineering profession in Europe and North America. Topics include the changing nature of the profession's work and institutions, the role of engineering professional societies, the relationship between engineers, engineering technologists, and engineering technicians, and the place of engineers in society. Prerequisite: WRI 123 or WRI 227.

**HIST 356 A History of Energy**

(3-0-3) SS

Study of the emphasis societies place on the development, safeguarding and exploitation of energy resources. Development of energy resources since the Industrial Revolution; exploitation of energy resources; oil shocks of the 1970s, glut of the 1980s; the modern energy paradigm. Prerequisite: WRI 123 or WRI 227.

**HIST 357 History of the Electric Grid**

(3-0-3) SS

Study of the electric grid as a large technological system. Topics of study include the creation of the electric grid by Edison and others, rural electrification, the rise and fall of the utility consensus and the politics of deregulation. Prerequisite: WRI 123 or WRI 227.

**HIST 392 Modern Asia**

(3-0-3) SS

China, Japan, and Korea from the early nineteenth century to the present. Emphasis on modern political movements and economic and cultural transformation. Prerequisite: WRI 123 or WRI 227.

**HIST 452 Globalization and the Pacific Northwest**

(3-0-3) SS

This seminar addresses globalization in the PNW. Topics include colonialism, mercantilism, markets, imperialism, and cultural exchange. PNW industries involved in globalization such as timber, fishing, ag-

riculture, tourism, and oil will be examined. Social movements and protests will also be considered.

Prerequisites: Wri 122

**HIST 468 History of the Pacific Northwest**

(3-0-3) SS

This course will cover the history of the Pacific Northwest including Native American settlements, exploration and later American settlements. It will include the impacts of institutional growth, urbanization, and resource development. The impact of national events upon the region will be explored.

Prerequisite: WRI 122.

**HIST 478 History of Oregon**

(3-0-3) SS

An overview of the history of Oregon. The primary focus is the pattern of European settlement of Oregon, the origins and development of state government and the impact of commercial and industrial development.

Prerequisite: WRI 123 or WRI 227.

**(HSC) Health Sciences****HSC 207 Seminar**

(Hours to be arranged each term.) Prerequisite: Health Sciences major or instructor consent.

**HSC 407 Seminar**

(Hours to be arranged each term.)

**HSC 485 Research and Project Proposal**

(3-0-3)

General aspects of conducting research with emphasis on biomedical approaches, constructing and testing hypotheses, interpreting and validating data, assessment of selected research paper, development and submission of a research proposal.

Prerequisite: MATH 361, Health Sciences major or instructor consent.

**(HUM) Humanities****HUM 107, HUM 207, HUM 307,****HUM 407 Seminar**

(Hours to be arranged each term.) H or HP

**HUM 125 Introduction to Technology, Society and Values**

(3-0-3) H

An introduction to the relationship of economic, political, and social contexts to

technological development with a focus on human values.

**HUM 147 Introduction to Humanities I**

(3-0-3) H

Study of the ideas and values from the classical period which have profoundly influenced Western culture. Readings and discussion will focus on literature, philosophy, the arts, and religion.

**HUM 148 Introduction to Humanities II**

(3-0-3) H

Study of the ideas and values from the Medieval to the Renaissance period which have profoundly influenced Western culture. Readings and discussion will focus on literature, philosophy, the arts, and religion.

**HUM 149 Introduction to Humanities III**

(3-0-3) H

Study of the ideas and values from the Age of Enlightenment to the modern period which have profoundly influenced Western Culture. Readings and discussion will focus on literature, philosophy, the arts, and religion.

**HUM 225 Contemporary Theater: Ashland Plays**

(3-0-3) H

Contemporary live drama viewed at Ashland Shakespearean Festival Theater. Review and analysis of original script prior to play experience. Post review and analysis of play performance, content: plot, character, diction, melody, spectacle. Course may be repeated for credit.

**HUM 235 Introduction to Film**

(3-3-4) H

Introduction to film history and appreciation. Students will engage with film across periods, genres, and national traditions to develop their understanding and analysis of the art of cinema. Film making techniques and the evolution of film culture are addressed.

**HUM 366 Engineering, Business and the Holocaust**

(3-0-3) H

Examines three questions: what happened during the Holocaust, who was responsible, and what happened to those responsible. Topics include Nazi philosophy, anti-Semitic legislation, the camp system, German engi-



neering and American business involvement, and aftermath.

Prerequisite: WRI 122.

## **(JOUR) Journalism**

### **JOUR 107, JOUR 207, JOUR 307, JOUR 407 Seminar**

(Hours to be arranged each term.)

### **JOUR 211 Publications—Student Newspaper**

(F,W,S)(2-3-3)

Practical experience and training in the elementary principles of newspaper writing, makeup, and layout. Members of this class will publish the student newspaper.

Prerequisite: WRI 121.

### **JOUR 311 Advanced Publications—Student Newspaper**

(F,W,S)(1-3-3)

Provides advanced experience and training in principles of newspaper editing, reporting, writing, makeup, layout, and specialty areas. Class members serve as the editorial staff.

Prerequisite: JOUR 211.

## **(MATH) Mathematics**

### **MATH 20 Basic Mathematics**

(3-0-3)

Operations with whole numbers, fractions and decimals. Ratio, proportion, and percent, with applications. Calculations using length, area, and volume. Estimation and unit conversion. Credits earned apply for enrollment (eligibility), but not apply toward a degree. An additional fee is required above regular tuition.

### **MATH 70 Elementary Algebra**

(F,W,S)(4-0-4)

For students whose preparation contains no algebra background or whose placement examination scores do not qualify for entry into Intermediate Algebra. The topics covered stress the fundamental properties of algebra, solving equations, and manipulating algebraic fractions. Credits earned apply for enrollment (eligibility) but do not apply toward a degree. An additional fee is required above regular tuition.

Prerequisite: MATH 20 with grade “C” or better, or equivalent.

### **MATH 97 Algebra Review**

(2-0-2)

Structured review for students whose Math Placement score may not reflect an accurate evaluation or students who want a refresher but who do not require a math placement. The course has individualized directed study using a comprehensive programmed instructional technology.

Course is graded P/W.

### **MATH 100 Intermediate Algebra**

(F,W,S)(4-0-4)

Fundamentals of algebra, linear and quadratic equations, systems of equations, inequalities, functions and graphs, radicals and exponents, and stated problems. (May not be used for graduation credit.)

Prerequisite: MATH 70 with grade “C” or better, or equivalent.

### **MATH 101 Accelerated Algebra**

(70, 100, 111)(4-0-4)

An accelerated algebra course with topics ranging from Elementary Algebra (MATH 70) to College Algebra (MATH 111). For entering students with good high school algebra backgrounds. All students will start in Elementary Algebra, and may receive credit for one of MATH 70, MATH 100, or MATH 111, depending on individual level of achievement. An additional self-support course fee is required.

### **MATH 102 Accelerated College Algebra/Trigonometry**

(W)(4-0-4)

An accelerated algebra/trigonometry course for exceptionally qualified students. All students will start with College Algebra (MATH 111), and may, with extra effort be able to complete Trigonometry (MATH 112). Depending on individual accomplishment, students will receive credit for either MATH 111 or MATH 112 but not both.

Prerequisite: MATH 100 or MATH 111 both with grade “B” or better.

### **MATH 105 Collegiate Mathematics**

(F, W, S)(4-0-4)

A variety of modern mathematical topics based on contemporary applications. Topics include combinatorics, probability, statistics, finance, matrices, and logarithmic and exponential functions.

Prerequisite: Intermediate Algebra with grade “C” or better.

### **MATH 107, MATH 207, MATH 307, MATH 407 Seminar**

(Hours to be arranged each term.)

### **MATH 111 College Algebra**

(F,W,S)(4-0-4)

Study of functions including graphs, operations and inverses. Includes polynomial, rational, exponential, logarithmic functions and their applications, and systems of equations.

Prerequisite: MATH 100 with grade “C” or better, or equivalent.

### **MATH 111A, MATH 111B College Algebra**

(111A FW; 111B WS)(1-2-2)

For students requiring Math 111 but desiring to learn the material at a slower pace. Math 111 content covered upon completion of MATH 111A and MATH 111B.

Prerequisite: For MATH 111A—Math 100 with grade “C” or better, or equivalent. Prerequisite: For MATH 111B—Math 111A with grade “C” or better.

### **MATH 112 Trigonometry**

(F,W,S)(4-0-4)

The trigonometric functions and their applications. Topics include graphs, identities, trigonometric equations, vectors, and complex numbers.

Prerequisite: MATH 111 with grade “C” or better, or equivalent.

### **MATH 211 Fundamentals of Elementary Mathematics I**

F(4-0-4)

This is the first course in the mathematics sequence for prospective elementary teachers. Topics include problem solving strategies, set theory, numeration, computational algorithms for whole numbers and integers, estimation, relations; use is made of calculators and manipulatives.

Prerequisite: MATH 100 or equivalent with grade “C” or better.

### **MATH 212 Fundamentals of Elementary Mathematics II**

W(4-0-4)

This is the second course in the mathematics sequence for prospective elementary teachers. Topics include decimals, percents, ratios and proportions, real numbers, probability and statistics; use is made of calculators and manipulatives.

Prerequisite: MATH 211 with grade “C” or better.

**MATH 213 Fundamentals of Elementary Mathematics III**

(S)(4-0-4)

This is the third course in the mathematics sequence for prospective elementary teachers and covers basic geometry. Topics include geometric shapes and their properties, measurement, congruence and similarity, and coordinate and transformational geometry; use is made of calculators and manipulatives. Prerequisite: MATH 211 with grade "C" or better.

**MATH 221 Introduction to Computational Software**

(2-0-2)

Solve applied problems involving formulas, functions, summation and iteration using Excel and MATLAB. Use built-in functions and graphing capabilities of MATLAB and Excel. Do vector and matrix calculations and write function files using MATLAB. Write and execute macros in Excel. Prerequisite: MATH 112.

**MATH 243 Introductory Statistics**

(4-0-4)

Descriptive statistics, numerical and graphical presentation of data, estimation and margin of error, hypothesis testing, correlation; interpretation of statistical results. Cannot be taken for graduation credit by students who have taken MATH 361. Prerequisite: MATH 100 or instructor's consent.

**MATH 251 Differential Calculus**

(F,W,S)(4-0-4)

Theory, computational techniques and applications of the derivative. Prerequisite: MATH 112 with grade "C" or better, or equivalent.

**MATH 252 Integral Calculus**

(F,W,S)(4-0-4)

Computational techniques for and applications of the definite and indefinite integrals. Prerequisite: MATH 251 with grade "C" or better.

**MATH 253N Sequences and Series**

(4-0-4)

Indeterminate forms and improper integrals. Infinite sequences and series, convergence, power series. Taylor series and applications. This course replaces MATH 254. Prerequisite: MATH 252 with grade "C" or better.

**MATH 254N Vector Calculus I**

(F,W,S)(4-0-4)

Vectors, vector functions, and curves in two and three dimensions. Surfaces, partial derivatives, gradients, and directional derivatives. Multiple integrals using rectangular and other coordinate systems. Physical and geometric applications. Prerequisite: MATH 252 with grade "C" or better.

**MATH 261 Introduction to Linear Algebra**

(3-0-3)

Matrices and matrix operations, systems of linear equations, vectors in a geometric setting, projections, dot products, cross products, inverse matrices, determinants, linear transformations, Eigenvalues, Eigenvectors. Use of MATLAB or equivalent CAS and/or a graphing calculator required. Pre- or corequisite: MATH 251 or instructor consent.

**MATH 311 Introduction to Real Analysis**

(4-0-4)

A one term stand-alone course on topics in real analysis, covering properties of real numbers, completeness axiom, continuity, convergence of sequences and series of numbers, convergence of sequences and series of functions. Emphasis will be placed on proofs. Prerequisites: MATH 253N and MATH 327, both with grade "C" or better.

**MATH 321 Applied Differential Equations I**

(F,W,S)(4-0-4)

The first in a two term sequence on the solutions of ordinary differential equations. Introduction to differential equations, first and second order equations with applications. Prerequisite: MATH 252 with grade "C" or better.

**MATH 322 Applied Differential Equations II**

(4-0-4)

The second in a two term sequence on the solutions of ordinary differential equations. Introduction to systems of equations, the Laplace transform and series solutions. Prerequisites: MATH 321 and MATH 341.

**MATH 327 Discrete Mathematics**

(F,S)(4-0-4)

Introduction to proof and mathematical abstraction. Topics include sets, set opera-

tions, functions, relations, sequences, series, recurrence relations, mathematical induction, equivalence relations.

Prerequisites: MATH 252, or junior standing and MATH 111, both with grade "C" or better.

**MATH 341 Linear Algebra I**

(4-0-4)

The study of vectors and matrices in Euclidean space, their geometric interpretations and application to systems of equations. Includes linear independence of vectors, basis and dimension, introduction to linear transformations, eigenvalues and eigenvectors, diagonalization, determinants.

Prerequisite: MATH 251 with grade "C" or better.

**MATH 342 Linear Algebra II**

(4-0-4)

A continuation of the topics of MATH 341 to the setting of abstract vector spaces. Includes the study of orthogonality, inner product spaces, eigenvalues and eigenvectors, matrix decompositions and a more advanced study of linear transformations. Prerequisite: MATH 341.

**MATH 346 Number Theory**

(4-0-4)

A proof-based course in the theory of the integers, including divisibility, primes, Euclid's Algorithm, Euler's Theorem and an introduction to algebraic structures. The course also includes applications of number theory such as RSA encryption. Prerequisite: MATH 327 with grade "C" or better.

**MATH 347 Fundamentals of Abstract Algebra**

(4-0-4)

Introduction to group theory and algebraic structures with applications. Prerequisites: MATH 254N, MATH 327, both with grade "C" or better.

**MATH 354 Vector Calculus II**

(4-0-4)

Review of vector functions, space curves, gradients, and directional derivatives. Introduction to vector analysis: vector fields, divergence, curl, line integrals, surface integrals, conservative fields, and the theorems of Gauss, Green and Stokes with applications to force, work, mass, and charge. Prerequisite: MATH 254N with grade "C" or better.

**MATH 361 Statistical Methods I**

(F,W,S)(4-0-4)

Descriptive statistics, experimental design, introduction to probability, common probability distributions, random variables, sampling distributions, hypothesis testing and confidence intervals for means using one and two samples, simple linear regression.  
Prerequisite: MATH 111 or instructor's consent.

**MATH 362 Statistical Methods II**

(W,S)(4-0-4)

Review of inferential statistics, analysis of variance one factor and two factor, simple and multiple regression, analysis of categorical data using tests and confidence intervals for proportions and chi-square tests, correlation, goodness of fit, logistic regression, non-parametric tests. Data sets used will come from various fields including: business, psychology, biology, environmental science, engineering, manufacturing and communication.  
Prerequisite: MATH 361 or instructor consent.

**MATH 371, MATH 372 Finite Mathematics and Calculus I, II**

(4-0-4)

Linear functions, matrices, linear programming, mathematics of finance, derivatives and their applications. The integral and its applications, and calculus of several variables. (MATH 371 cannot be used for graduation credit by students who have taken MATH 251.)

Prerequisite: For MATH 371–MATH 111 with grade “C” or better.

Prerequisite: For MATH 372–MATH 371 with grade “C” or better.

**MATH 421 Applied Partial Differential Equations I**

(4-0-4)

The first course in a three term sequence in applied partial differential equations. Modeling physical systems using differential equations, classifying differential equations and introduction to the methods of solving partial differential equations (separation of variables, Fourier series, transform methods).

Prerequisite: MATH 322.

**MATH 422 Applied Partial Differential Equations II**

(4-0-4)

The second course in a three term sequence in applied partial differential equations.

Introduction to solution techniques using eigenvalues and eigenfunctions. Presentation of eigenfunctions which form orthogonal bases such as Bessel functions and Legendre polynomials.

Prerequisite: MATH 421.

**MATH 423 Applied Partial Differential Equations III**

(4-0-4)

The third course in a three term sequence. Applications of linear and weakly nonlinear partial differential equations. Analytical solution techniques for parabolic, elliptic, and hyperbolic equations. Green's functions, integral methods, shocks, and the method of characteristics.

Prerequisite: MATH 422.

**MATH 425 Vector Analysis**

(3-0-3)

Operations on vectors including dot product, cross product, curl and differentiation; tangent and normal vectors; divergence with applications. Prerequisite: MATH 254N.

**MATH 451 Numerical Methods I**

(4-0-4)

Computer applications of matrix methods, iterative solutions of equations, and systems of equations, polynomial interpolation and curve fitting, numerical differentiation and integration.

Prerequisites: MATH 252, MATH 341 or MATH 261, and a programming language.

**MATH 452 Numerical Methods II**

(4-0-4)

Numerical solution of ordinary differential equations. Numerical solution of initial-value problems using Runge-Kutta methods and linear multistep methods; introduction to boundary value problems. Analysis of stability, accuracy, and implementation of methods.

Prerequisites: MATH 451 and MATH 321.

**MATH 453 Numerical Methods III**

(4-0-4)

Numerical solution of partial differential equations. Numerical solution of boundary value problems and initial-boundary value problems using finite difference and finite element methods. Analysis of stability, accuracy, and implementation of methods.

Prerequisites: MATH 421 and MATH 452.

**MATH 465 Mathematical Statistics**

(W, S)(4-0-4)

Counting techniques, probability, discrete and continuous random variables and distribution functions, joint probability distributions; expected value, variance and covariance; decision making.

Prerequisite: MATH 254N.

**(MECH) Mechanical Engineering****MECH 107, MECH 207, MECH 307, MECH 407 Seminar**

(Hours to be arranged each term.)

**MECH 160 Materials I**

(2-3-3)

Survey of materials used in industry and their physical and chemical principles as they relate to structure, properties, corrosion, and engineering applications. Major consideration given to metal alloys. Introduction to polymers, ceramics and composites included. Prerequisite: CHE 221 or equivalent.

**MECH 304, MECH 404 Co-op Field Practice**

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

**MECH 312 Dynamics II**

(3-0-3)

Continuation of the study of kinematics and kinetics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers.

Prerequisites: ENGR 212, MATH 321.

**MECH 313 Thermodynamics II**

(3-0-3)

Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery.

Prerequisite: ENGR 355.

**MECH 315 Machine Design I**

(3-0-3)

Study of stress and fatigue analysis as applied to machine elements.

Prerequisite: ENGR 213.

**MECH 316 Machine Design II**

(3-0-3)

Application of stress and fatigue analysis in the design and selection of machine elements.

Prerequisite: MECH 315.

**MECH 318 Fluid Mechanics I**

(3-3-4)

Covers fluid properties, fluid statics, conservation laws of pipe flow, drag, lift fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, and forces due to fluid motion.

Prerequisites: ENGR 211, PHY 221.

Pre- or corequisite: EE 223 or MECH 363.

**MECH 323 Heat Transfer I**

(3-0-3)

An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited.

Prerequisites: MATH 321, MECH 318.

**MECH 326 Electric Power Systems**

(2-3-3)

Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.

Prerequisites: MECH 363 and ENGR 236.

**MECH 351 Finite Element Analysis**

(2-3-3)

This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisites: MECH 315, MET 375.

**MECH 360 Materials II**

(3-0-3)

This course extends the MET 160 Materials I class using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisites: MET 160 and CHE 201 or CHE 221.

**MECH 363 Instrumentation**

(2-3-3)

Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems are considered. Methods of calibration, correction and data reduction are presented.

Prerequisite: ENGR 213, PHY 222.

Pre- or corequisite: ENGR 236.

**MECH 375 Solid Modeling**

(2-3-3)

Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242.

**MECH 405 Reading and Conference**

(Hours to be arranged each term.)

**MECH 414 Introduction to Aerodynamics**

(3-0-3)

An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355, MECH 318.

**MECH 415 Design Project**

(2-3-3)

This course involves using material from prior course work in individual student projects.

Prerequisites: MECH 315, MECH 318, MET 242.

Pre- or corequisite: MECH 316.

**MECH 417 Fluid Mechanics II**

(2-3-3)

Fluid Kinematics, differential analysis, similitude and modeling, and compressible flow. Computational fluid dynamics is introduced.

Prerequisites: ENGR 355, MATH 321, MECH 318.

**MECH 421 Introduction to Wind Tunnels**

(2-3-3)

An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating char-

acteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: MECH 318, MECH 363.

**MECH 427 Experiments in Thermodynamics**

(2-3-3)

Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MECH 313, MECH 363.

**MECH 433 HVAC**

(2-3-3)

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisite: MECH 323.

**MECH 436 Applied Control Systems**

(2-3-3)

An introduction to control systems. Both classic control theory and programmable logic controllers are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency responses along with control components and PLC programming.

Prerequisites: MECH 318, MECH 480.

**MECH 437 Heat Transfer II**

(1-3-2)

A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisites: MECH 323, MECH 363.

**MECH 438 Reciprocating and Turbine Engines**

(3-0-3)

Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of

development, theory and practice of operation.

Prerequisites: MECH 313, MECH 315, MECH 318.

### **MECH 475 Parametric Modeling** (2-3-3)

Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.

Prerequisite: MET 375.

### **MECH 480 Vibrations** (2-3-3)

An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.

Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, MECH 363.

### **MECH 490 Senior Projects I** (2-3-3)

The first of a three-term comprehensive group design project, focusing on the design proposal. This sequence applies material from prior course work, along with concepts of project management, design optimization, and other material related to a group engineering project.

Prerequisites: ENGR 355, MECH 315, MECH 318, MET 375; or instructor consent.

### **MECH 491 Senior Projects II** (2-3-3)

The second of a three-term comprehensive group design project, focusing on project design.

Prerequisites: MECH 490, previous term from same instructor, or advisor and instructor consent.

### **MECH 492 Senior Projects III** (1-6-3)

The third of a three-term comprehensive group design project, focusing on project construction and testing.

Prerequisites: MECH 491, previous term from same instructor, or advisor and instructor consent.

## **(MET) Mechanical Engineering Technology**

### **MET 107, MET 207, MET 307, MET 407 Seminar**

(Hours to be arranged each term.)

### **MET 108 Geometric Dimensioning and Tolerancing**

(2-0-2)

The study and application of ANSI geometric dimensioning and tolerancing principles relative to the preparation of engineering drawings.

Prerequisite: MET 241.

### **MET 111 Orientation I**

(1-3-2)

Introduction to modern tools of engineering. Creativity in the design of systems and components; on both design and presentation teams. Identification, analysis and solutions to engineering problems. Effective communication techniques. Technical sketching and isometric drawing skills.

### **MET 112 Orientation II**

(1-3-2)

Continuation of MET 111. This sequence will introduce the students to economic, environmental, social, political, ethical, health and safety realities of the campus and the engineering work place; as well as club, networking and internship opportunities.

Prerequisite: MET 111.

### **MET 160 Materials I**

(2-3-3)

Survey of materials used in industry and their physical and chemical principles as they relate to structure, properties, corrosion, and engineering applications. Major consideration given to metal alloys. Introduction to polymers, ceramics and composites included.

Prerequisites: CHE 101/CHE 104 or CHE 201/ CHE 204 or CHE 221.

### **MET 218 Fluid Mechanics**

(3-3-4)

Covers fluid properties, laws of fluid statics, and fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, flow in ducts, forces due to fluid motion, and fluid machinery.

Prerequisites: MATH 112; PHY 201 or PHY 221.

### **MET 232 Thermodynamics**

(3-0-3)

An introductory course in thermodynamics. Develops understanding of energy, heat, work, efficiency, the ideal gas law, the first and second laws of thermodynamics and the general energy equation.

Prerequisites: MATH 252; PHY 202 or PHY 222.

### **MET 241 CAD for Mechanical Design I**

(1-3-2)

Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of 2-D drawings using current industry software. Topics include construction principles, input schemes, command structures, and data management.

Prerequisite: MET 111.

### **MET 242 CAD for Mechanical Design II**

(1-3-2)

Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of drawing sets using current industry software. Topics include detail part drawings, assembly drawings, and an introduction to 3-D drafting.

Prerequisite: MET 241.

### **MET 298 Reading and Conference**

(Hours to be arranged each term.)

### **MET 299 Laboratory Practice**

(Hours to be arranged each term.)

### **MET 304, 404 MET Co-op Field Practice**

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

### **MET 313 Applied Thermodynamics**

(3-0-3)

Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors,

and refrigeration machinery.

Prerequisite: ENGR 355 or MET 232.

### **MET 315 Machine Design I**

(3-0-3)

Knowledge and skills developed in preceding courses are extended and applied to design and selection of machine elements and machines. Attention is given to functional requirements, methods of manufacture, choice of materials, and economic factors.

Prerequisites: ENGR 213 or ENGT 232; MET 160; PHY 201 or PHY 221.

### **MET 316 Machine Design II**

(3-0-3)

A study of power transmission systems components, their selection, and application to power transmission systems. Special consideration is given to the dynamic characteristics of the systems.

Prerequisite: MET 315.

### **MET 323 Heat Transfer I**

(3-0-3)

An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited.

Prerequisites: ENGR 355 or MET 232; MET 218.

### **MET 326 Electric Power Systems**

(2-3-3)

Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.

Prerequisite: ENGR 236 or EE 223.

### **MET 351 Finite Element Analysis**

(2-3-3)

This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisite: MET 375.

Pre- or corequisite: MET 315.

### **MET 360 Materials II**

(3-0-3)

This course extends the MET 160 Materials I class using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisite: MET 160.

### **MET 363 Instrumentation**

(2-3-3)

Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems considered. Methods of calibration, correction and data reduction presented.

Prerequisite: PHY 202 or PHY 222.

Pre- or corequisite: ENGR 236.

### **MET 375 Solid Modeling**

(2-3-3)

Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242.

### **MET 405 Reading and Conference**

(Hours to be arranged each term.)

### **MET 414 Applied Aerodynamics**

(3-0-3)

An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355 or MET 232;

MET 218.

### **MET 415 Design Project**

(2-3-3)

This course involves using material from prior coursework in individual student projects.

Prerequisites: MET 218, MET 315.

Pre- or corequisite: MET 316.

### **MET 416 Energy Systems**

(3-0-3)

Compares available energy resources by application of laws and principles of thermodynamics. Provides computational skills for assessment of a given resource with respect to a given application. Develops understanding of energy economics.

Prerequisites: ENGR 355 or MET 232;

MET 326.

### **MET 417 Gas Laws**

(2-3-3)

Application of thermodynamics and fluid mechanics to the analysis of flow of both ideal and real gasses in pipes, nozzles, diffusers,

compressors and turbines. The course also emphasizes the use of appropriate instrumentation.

Prerequisites: MET 218, MET 313, MET 363.

### **MET 421 Wind Tunnel Technology**

(2-3-3)

An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: ENGR 355 or MET 232;

MET 218, MET 363.

### **MET 426 Fluid Power Systems**

(2-3-3)

A mechanical approach to industrial hydraulic applications with emphasis on selection and function of hardware and interfacing of hydraulic systems with mechanical, fluidic and electrical/ electronic controls.

Prerequisites: MET 218, MET 363.

### **MET 427 Experiments in Thermodynamics**

(2-3-3)

Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MET 313, MET 363.

### **MET 433 HVAC**

(2-3-3)

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisites: MET 313, MET 323.

### **MET 436 Control Systems**

(3-0-3)

An introduction to control systems. Both classic control theory and modern digital process control are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency response along with control components and

digital controllers.

Prerequisites: ENGR 212, ENGR 236, ENGR 355 or MET 232; MET 218, MET 363.

### **MET 437 Heat Transfer II**

(1-3-2)

A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisites: MET 323, MET 363.

### **MET 438 Reciprocating and Turbine Engines**

(3-0-3)

Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.

Prerequisites: MET 218, MET 313, MET 315.

### **MET 462 Vacuum Technology**

(2-3-3)

An introductory course defining the role of high and ultra-high vacua in the process of high vacuum technology. Material will include such topics as vacuum pumping, vacuum gauging, processing of materials in a vacuum, evaporative deposition, sputtering, thin films, mass spectrometry, and leak detection.

Prerequisite: MET 417.

### **MET 465 Computational Strength of Materials**

(3-0-3)

Advanced topics in structural mechanics using calculus and finite element approaches. Topics include stresses and deflections of non-uniform 2-d beams; shafts and connecting rods; axisymmetric shells; circular and rectangular plates; inertial stresses from rotation and seismic effects. Applications are emphasized.

Prerequisites: ENGT 230 and ENGT 231; or ENGR 211 and ENGR 213; MET 351 and MATH 252.

### **MET 475 Parametric Modeling**

(2-3-3)

Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and

practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.

Prerequisite: MET 375.

### **MET 480 Vibrations**

(2-3-3)

An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.

Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, MECH 363.

### **MET 490 Senior Projects I**

(2-3-3)

The first of a three-term comprehensive group design project, focusing on the design proposal. This sequence applies material from prior coursework, along with concepts of project management, design optimization, and other material related to a group engineering project.

Prerequisites: ENGR 355 or MET 232; MET 218, MET 315 and MET 375; or instructor consent.

### **MET 491 Senior Projects II**

(2-3-3)

The second of a three-term comprehensive group design project, focusing on project design.

Prerequisite: MET 490 previous term from same instructor, or advisor and instructor consent.

### **MET 492 Senior Projects III**

(1-6-3)

The third of a three-term comprehensive group design project, focusing on project construction and testing.

Prerequisite: MET 491 previous term from same instructor, or advisor and instructor consent.

## **(MFG) Manufacturing Engineering Technology**

### **MFG 101 Introduction to Manufacturing**

(2-3-3)

An introduction to the manufacturing engineering technology discipline. Orientation to the use of personal computers. Instruction in problem solving and laboratory procedures

emphasized. Laboratory provides demonstration and practice in a variety of manufacturing equipment and procedures.

### **MFG 103 Introductory Welding Processes**

(2-3-3)

Applications of welding in modern industry. Topics include: Oxyacetylene welding and cutting, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, and robotic welding.

### **MFG 107, MFG 207, MFG 307, MFG 407 Seminar**

(Hours to be arranged each term.)

### **MFG 112 Introduction to Manufacturing Processes**

(3-0-3)

A survey of common manufacturing processes, including a history of manufacturing technology. Manufacturing economic considerations. Influence of product design on process selection. Manufacturing taxonomy, surface finish, tolerances, and functional specifications.

### **MFG 120 Manufacturing Processes I**

(2-6-4)

An introductory course in metal removal processes emphasizing drilling, milling, and lathe processes. Includes tool bit grinding. Emphasis on production speeds and feeds. Prerequisites: MATH 100, MET 111.

### **MFG 204 Data Management**

(2-0-2)

Current topics in data acquisition and management.

### **MFG 220 Manufacturing Processes II**

(2-3-3)

Advanced concepts in material removal. Turning, milling, shaping, and drilling. Cutting tools and cutting requirements. Prerequisites: MET 160, MET 241, MFG 120.

### **MFG 223 Casting and Molding Processes**

(3-3-4)

Casting and molding processes including: pattern making, casting and molding methods, mold and core making, pouring, cleanup, sand conditioning and testing, qual-

ity considerations and economic factors.  
Prerequisites: ENGT 115, MET 160.

### **MFG 245 Electronics Manufacturing** (3-0-3)

Processes and materials specific to the production of printed circuit board and integrated circuit components. Topics include surface mount technology, vacuum system theory, photolithography, etching and deposition processes, microbonding, and component packaging.

Prerequisites: CHE 101, MET 112.

### **MFG 275 CAD for Manufacturing** (2-3-3)

Computer aided drafting for manufacturing. Presents equipment and programs from the user's perspective. Topics include construction principles, input schemes, command structures, and data management.

Prerequisite: One computer language.

### **MFG 295 Individual Studies** (Hours to be arranged each term.)

### **MFG 298 Reading and Conference** (Hours to be arranged each term.)

### **MFG 299 Laboratory Practice** (Hours to be arranged each term.)

### **MFG 313 Manufacturing Analysis and Planning** (3-0-3)

Analysis and planning of manufacturing methods, procedures and equipment. Includes designing for manufacturing efficiency, tolerance analysis, equipment and resource allocation and scheduling.

Prerequisite: ACC 333 or MGT 321 or MFG 120.

### **MFG 314 Geometric Dimensioning and Tolerancing** (2-3-3)

The study and application of ANSI and ISO geometric dimensioning and tolerancing principles and practices relative to product design and manufacturing operations.

Prerequisites: MATH 112, MET 241.

### **MFG 315 Geometric Dimensioning and Tolerancing Laboratory** (0-3-1)

Laboratory exercises using parts that have geometric drawing requirements.

Corequisite: MFG 314.

### **MFG 317 Machine Element Design** (3-0-3)

Stress calculations and design of machine elements for general applications. Theories of failure, fatigue considerations, and material selection of shafts and associated parts, gear and belt drives, bearings, power screws, threaded fasteners, riveting, welding, and springs.

Prerequisites: ENGR 213 or ENGT 231 and MET 241, or instructor consent.

### **MFG 325 Principles of Metrology, Machining and Welding** (3-3-4)

Measuring techniques using precision devices. Metal removal processes such as lathe, mill, and grinder. Correct use of tools and cutting parameters. Basic welding processes and theory.

### **MFG 326 Solid Mechanics** (3-0-3)

Concentrated study of statics and strength of materials comprising the principles of equilibrium, strain-stress relationships, and analysis of internal stresses for different loading systems.

Prerequisite: MATH 112.

### **MFG 331 Industrial Controls** (2-3-3)

Fundamentals of control of manufacturing processes. Applications of relay logic, input and output devices, and programmable logic controllers (PLC). Design of complete control circuits, selection of components, and cost estimation. PLC programming for discrete event control and for analog applications.

Prerequisite: MET 326.

### **MFG 333 Statistical Methods for Quality Improvement** (3-0-3)

Strategies for continuous manufacturing process improvement. Graphical and numerical methods for data analysis. Methods for manufacturing process control and acceptance criteria.

Prerequisite: MATH 361.

### **MFG 334 Manufacturing Group Project** (1-6-3)

Development of a product by a group of manufacturing students working together. This includes creating or modifying the de-

sign of the product, writing operation sheets, specifying materials, tools and equipment needed, design of special tooling, setup and operation of equipment and actual manufacturing of the project.

Prerequisite: MFG 342.

### **MFG 341 Numerical Control Programming** (2-3-3)

Introduction to manual numerical control programming. Includes interpreting part drawings, process planning, machining setup and sequence. Program debugging and introduction to tool path simulation and computer-aided programming tools.

Prerequisites: MATH 112, MFG 120, MET 241.

### **MFG 342 Computer Aided Machining** (2-3-3)

Development of CNC machine tool manufacturing programs using computer-aided process planning and advanced CAD/CAM software. Emphasis on analysis and planning required for successful CNC production, development of CAD drawings and solid models for CAM program development, toolpath simulation, and manufacturing engineering issues.

Prerequisites: MFG 341, MET 375.

### **MFG 343 Manufacturing Tool Design** (3-0-3)

Fundamentals of jig and fixture design. Locating and clamping methods for manufacturing production. Design of sheet-metal stamping, piercing, and forming tools. Study of the effect of manufacturing machines and production methods on tooling design.

Prerequisites: MET 241, MET 315, MFG 314, or instructor consent.

### **MFG 344 Design of Manufacturing Tooling** (2-3-3)

Using material from prior courses students work in individual and team design projects. Design and analyze a variety of manufacturing fixtures, jigs, molds, and stamping dies.

Prerequisites: MET 241, MFG 343.



### **MFG 351, MFG 352, MFG 353 Microelectronics Manufacturing Processes I, II, III**

(3-0-3)

A three term sequence providing in-depth theory of the processes used in the manufacture of electronic components. Primary topics include integrated circuits, printed circuits, electronic assembly. Vacuum system theory, photolithography, process specific chemistry, etching and deposition processes, and surface mount technology.

Prerequisites: For MFG 351—CHE 101, PHY 202.

Prerequisite: For MFG 352—MFG 351. Prerequisite: For MFG 353—MFG 352.

### **MFG 404 Co-op Field Practice**

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

### **MFG 405 Reading and Conference**

(Hours to be arranged each term.)

### **MFG 408 Workshop**

(Hours to be arranged each term.)

### **MFG 415 Finishing Methods**

(2-0-2)

Review of material finishing technologies with focus on functional requirements of final product, life-cycle environmental considerations, and manufacturing technologies for material finishing.

Prerequisite: MET 160.

### **MFG 420 Manufacturing Processes III**

(3-0-3)

Introduction to less conventional and recently developed manufacturing processes and materials. Emphasis on understanding unique characteristics, advantages, limitations, and applications. Analysis required for selection of appropriate materials and processes. Examples of computer programs that aid the selection process.

Prerequisites: MATH 112; and MFG 220 or MFG 325; and PHY 201/PHY 221.

### **MFG 425 Plastic Manufacturing Processes**

(2-3-3)

Fundamentals of polymer science and plastic manufacturing methods. Introduction to the affect of chemistry and morphology of plastics on material selection, product design, and process design. Emphasis is on thermo-plastic processes such as injection molding. Prerequisites: MET 160 and MET 375, or instructor consent.

### **MFG 428 Manufacturing Engineering Certification**

(1-0-1)

Students are required to take the Certified Manufacturing Engineer Exam or Certified Manufacturing Technician Exam offered by the Society of Manufacturing Engineers.

Prerequisite: Graduating senior.

### **MFG 445 Plant Layout and Handling Systems**

(3-0-3)

In-depth study of facilities planning for manufacturing engineers. Focus is on layout optimization algorithms and applications, work cell design, warehouse design, materials handling systems, process/product/material/labor cost estimates and evaluations, and agile manufacturing.

Prerequisites: MFG 112, MFG 313.

### **MFG 447 Lean Manufacturing**

(2-3-3)

Introduction of principles, techniques and skills of lean manufacturing. Process optimization and quality improvement for manufacturing. Plant layout, design and job scheduling. JIT skills, such as Kaizen, Kanban, value added analysis and one piece flow to reduce inventory and waste.

Prerequisites: MFG 313 or MFG 333.

### **MFG 453 Automation and Robotics in Manufacturing**

(2-3-3)

Study of the appropriate level of manufacturing automation based upon economics and productivity. Discussion of robotics and a study of automated manufacturing including automatic machine design and material handling.

Prerequisite: Senior standing in MET or MfgET or permission of instructor.

### **MFG 454 Thermal Systems for Manufacturing**

(3-0-3)

Fundamentals of thermal energy analysis, including introduction to thermodynamics and heat transfer. Emphasis is on solving manufacturing related problems in thermal process control and analysis.

Prerequisite: MATH 252.

### **MFG 456 Materials Science**

(3-0-3)

Study of the relationship of a material's structure to its properties. Materials studied include nonferrous metals, polymers, ceramics, composites, and electronics materials.

Prerequisite: MFG 420.

### **MFG 461 Senior Project I**

(1-6-3)

The first term of the three-term comprehensive capstone manufacturing project. This term concentrates on the development and presentation of a formal project proposal, followed by early stages of project development.

Prerequisites: MFG 313, MFG 331, MFG 342 or instructor consent.

### **MFG 462 Senior Project II**

(0-9-3)

The second term of a three-term project. This term concentrates on material acquisition and process development.

Prerequisite: MFG 461.

### **MFG 463 Senior Project III**

(0-9-3)

The final term of a three-term project. Process refinement and production of the product agreed to during the proposal phase. Requires formal reporting and presentation.

Prerequisite: MFG 462.

### **MFG 465 Advanced Welding Methods**

(3-0-3)

High energy density, solid state, and plastics welding processes. Welding metallurgy supports, metal combination choices and solutions to typical welding problems. Codes, procedure qualification, welding design and nondestructive testing.

Prerequisites: MET 160, MFG 103.

### **MFG 503 Thesis**

(Variable credit 1-16)

Course may be repeated for credit.

**MFG 507 Seminar**  
(Hours to be arranged each term.)

**MFG 521 The Manufacturing Management Team in the Global Enterprise**  
(3-0-3)

Concepts and theories needed to understand the management of people, work groups, and organizations in a global environment. Exploration of cultural differences, organizations, communication and business relationships; strategic thinking in a global context, and international e-communications. Emphasis on contemporary case studies regarding the operational problems facing the international firm.

**MFG 522 Manufacturing Business Philosophies**  
(3-0-3)

Contemporary world class manufacturing concepts and philosophies including Just-in-Time (JIT) applications for manufacturing and inventory management; methods and practices of total quality control in manufacturing; and continuous improvement techniques in manufacturing. Focus on contemporary cases in global manufacturing.

**MFG 523 Capitalization Principles for Manufacturing**  
(3-0-3)

Theory and concepts of capitalization for manufacturing assets; land, buildings, and equipment. Historical cost for valuing an asset. Net income, real and tax depreciation, and timing the disposal or exchange of assets. Exploration of capitalization of cost, post-acquisition asset costs, interest capitalization and expense, asset impairments, and multinational capital budgeting and financial management.

**MFG 524 Project and Budget Planning for Manufacturing**  
(3-0-3)

Exploration of the theories, tools, and techniques needed to effectively plan and manage manufacturing projects and budgets. Development of the characteristics of project plans including scope of work statements, work breakdown structure, project schedules, schedule and budget metrics, and project change cost analysis. Core topics include cost, time, and resource estimation, management and budgeting.

**MFG 525 International Economics for Manufacturing**  
(3-0-3)

Exploration of international economics. Impact on manufacturing industries. Focus on the foundations of international trade including classical and modern theories of production and industrial organization. Free trade policies; foreign competition; direct foreign investment, fiscal and monetary policy; tariffs, quotas, and subsidies. International monetary market on production, and anti-globalization politics. Concentration on contemporary cases in manufacturing. Prerequisites: ECO 201 and ECO 202 or equivalent (See instructor).

**MFG 531 Engineering Mechanics**  
(3-0-3)

Fundamentals of statics. Dry, viscous, and rolling friction. Kinematics of particles: rectilinear and curvilinear motion. Kinetics of particles: work and energy, impulse and momentum. Kinematics of rigid bodies: translation and rotation. Kinetics of rigid bodies: work and energy, impulse and momentum. Fundamentals of stress analysis.

**MFG 533 Thermal Processes and Technology in Manufacturing**  
(3-0-3)

Review of the laws of thermodynamics. Review of heat transfer including conduction, convection, and radiation. Vacuum technology. Autoclave processes. Cryogenics: materials, techniques, and safety. Plasma processes. The processing of nonmetallics. The processing of insulation materials. Energy costs and conservation in manufacturing processes.

**MFG 534 Design Technology for Manufacturability**  
(3-0-3)

Cutting costs and improving productivity. Managing the manufacturing supply chain. Reducing time to market. Establishing core competencies and maintaining vital corporate best practices. The role of standards and lean manufacturing in design.

**MFG 535 Product Life Software**  
(3-0-3)

Use of high-end enterprise-wide software products for integrating design, automating the workflow, and comprehensively controlling security. Revision management over all types of data. Creating document links. Leveraging subject matter experts across the extended enterprise.

**MFG 536 Automated Technology for Tool Path Generation**  
(3-0-3)

Reviewing and validating manufacturing processes for administrators, managers, and designers. Reviewing the creation of tool paths using standard 3D and 2D mechanical design tools and the generative 2.5-axis and 3, 4 and 5-axis surface machining NC software tools. Controller, machine, and software selection and integration.

**MFG 537 Product Data Management and Configuration Control**  
(3-0-3)

Capturing intellectual property at its source from CAD design, manufacturing and maintenance, driving the product information across the extended enterprise, and enabling its use in other branches and partners in the enterprise. Creating the integration of better and more efficient decisions and processes over the life cycle of the product.

**MFG 538 Special Problems in Manufacturing Software**  
(3-0-3)

Independent study using advanced functionality in high-end manufacturing and enterprise software. Approval of faculty advisor required.

**MFG 562 Advanced Materials Science and Technology**  
(3-0-3)

Advanced engineering materials. Recent advances in development and applications of metals, polymers, ceramics, and composites. Emphasis on the relationship between structure and properties. Manufacturing processes explored. Application of established standards for materials properties determination.

**MFG 563 Inventory Control and Production Planning**  
(3-0-3)

Introduction of concepts, principles, techniques, strategies and applications related to demand forecasting, production planning, performance measurements, quality control, inventory control and continuous improvement for manufacturing systems.

**MFG 564 Quality Concepts and Philosophies**  
(3-0-3)

Understanding quality, Models and Framework for TQM, Leadership & Commitment,

Planning, Strategy & Goal deployment, Partnerships & Resources, Performance measurement, Self-assessment, Audits & Reviews, Benchmarking, Process Management, Continuous Improvement; Culture change through teamwork, Communication, Implementing TQM, and Case studies.

### **MFG 595 Selected Graduate Topics in Manufacturing**

(3-0-3)

Manufacturing related topics in engineering science and design. Manufacturing related topics in software and computer integration. Manufacturing related topics in materials and processing technology. Manufacturing related topics in business and management. Course may be repeated for credit.

### **MFG 596 Selected Topics in Engineering Science and Design Technology**

(3-0-3)

Manufacturing related topics in engineering science and design. Course may be repeated for credit.

### **MFG 597 Selected Topics in Manufacturing Software and Computer Integration**

(3-0-3)

Manufacturing related topics in software and computer integration. Course may be repeated for credit.

### **MFG 598 Selected Topics in Advanced Manufacturing Materials and Processes Technology**

(3-0-3)

Manufacturing related topics in materials and processing technology. Course may be repeated for credit.

### **MFG 599 Selected Topics in Business, Financial and Management Processes**

(3-0-3)

Manufacturing related topics in business and management. Course may be repeated for credit.

## **(MGT) Management**

### **MGT 107, MGT 207, MGT 307, MGT 407 Seminar**

(Hours to be arranged each term.)

### **MGT 212 Fundamentals of Renewable Energy Management**

(3-0-3)

Explores primary energy sources available for power generation. Includes cost comparisons of traditional sources (gas, coal, nuclear, hydro) and renewable sources (solar, geo-thermal, wind, biofuels, wave and tidal). Evaluates and benchmarks benefits of traditional versus renewable energy sources, long-term vs. short-term feasibility and strategic decision-making in energy generation and utilization.

Prerequisites: ACC 201 and REE 201.

### **MGT 321 Operations Management I**

(3-0-3)

Functions of the operations division within the organizational structure. Manufacturing and service organization trends. Capacity planning with forecasting and master scheduling. Introduction to Just-In-Time concepts.

Prerequisite: BUS 215, BUS 317 or BUS 304.

### **MGT 322 Operations Management II**

(3-0-3)

Supply chain management for service and manufacturing companies. Covers flows of goods and services through relationships with business customers, suppliers and partners. Students learn how to manage strategic, operational and tactical planning using best-known practices and efficient use of information systems. Evaluate and design effective supply chains.

Prerequisite: MGT 321.

### **MGT 323 Operations Management III**

(3-0-3)

Effective budgeting methods for industrial environments. Budget planning, formation and cost controls. Flexible budgets and expense management. Manufacturing/non-manufacturing costs and cost/contribution analysis.

Prerequisite: ACC 203 with grade "C" or better.

### **MGT 345 Engineering Economy**

(3-0-3)

Capital expenditure, economic life and replacement analysis based on net present value, periodic costs, internal and incremental rates of return. Coverage of compound

interest, value flows, economic equivalences, depreciation, taxes and inflation.

Prerequisite: MATH 105 or MATH 111.

### **MGT 391, MGT 392 Co-op Field Practice**

(0-9-3)

Credit will be given for an approved work program related to the student's field of specialization for a continuous 10-week period. The employer and the type, level and difficulty of the particular job must be approved by the Management Department prior to employment.

### **MGT 445 Project Management**

(2-3-3)

Advanced application of the Critical Path Method to organization and control of project implementation. Applications software will be used to create and evaluate project networks and to develop management reports.

Prerequisite: MGT 321 or MET 112.

### **MGT 461 Lean/Six Sigma Management I**

(3-0-3)

Lean thinking as applied to production and service operations. Kaizen, kaikaku, pull production and systems, value stream mapping and analysis. Standardized work charts and combination tables to streamline work content and achieve flow. Identifying sources of muda and its elimination.

Prerequisite: BUS 215 or MGT 321.

### **MGT 462 Lean/Six Sigma Management II**

(3-0-3)

Overview course of Six Sigma management roles, responsibilities and terminology. Students will understand the tools and the phases of the DMAIC model and explore business cases to understand how Six Sigma techniques are applied to business.

Prerequisite: MATH 361.

### **MGT 463 Lean/Six Sigma Management III**

(3-0-3)

Techniques and tools applied toward improvement of basic business processes. Process documentation, flowcharting, streamlining, benchmarking and value-added assessment. Methods for measuring process efficiency and effectiveness and reducing waste and bureau-

cracy in service and manufacturing situations with particular emphasis to the employment of information technology.  
Prerequisite: MGT 462.

## (MIS) Management Information Systems

### MIS 101 Word Processing Software Laboratory

(0-3-1)

Word processing lab using Microsoft Word software. Includes creating and editing documents, letters, Web pages, forms, labels, and newsletters, research papers, an index and table of contents.

### MIS 102 Spreadsheet Software Laboratory

(0-3-1)

Spreadsheet lab using Microsoft Excel software. Includes creating worksheets, charts, formulas, functions, what-if analysis, sorting, multiple worksheets, workbooks, templates, pivot tables and importing of data.

### MIS 103 Presentation Graphics Software Laboratory

(0-3-1)

Presentation graphics lab using Microsoft PowerPoint software. Creation of presentations for use on paper, overhead transparencies, on a projection device, and Internet virtual presentations. Includes use of text, graphics, charts, and multimedia applications to create professional-looking presentations.

### MIS 107, MIS 207, MIS 307, MIS 407 Seminar

(Hours to be arranged each term.)

### MIS 113 Introduction to Database Systems

(2-3-3)

Introduces concepts of desktop computer-based database systems. Topics include database management issues, database design, creating and maintaining a database, normalization, table structures, and creating user queries, reports, and forms. Basic database security is discussed.

### MIS 115 Visual BASIC Programming

(3-3-4)

Computer concepts and problem solving methods in the Windows environment using Visual BASIC. Topics include algorithms, simple data types, condition and iterative

structures, functions and procedures, and the program documentation.  
Prerequisite: MATH 100 or instructor consent.

### MIS 116 C++ Programming I

(3-3-4)

Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed CST 116.  
Pre- or corequisite: MATH 111.

### MIS 118 Programming Fundamentals

(3-3-4)

Computer concepts and problem solving methods in the Windows environment using C# programming language. Topics include algorithms, simple data types, condition and iterative structures, functions and procedures, and the program documentation.  
Prerequisite: MATH 100 or instructor consent.

### MIS 126 C++ Programming II

(3-3-4)

Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed CST 126.  
Prerequisite: MIS 116, with grade "C" or better or instructor consent.

### MIS 130 Computer Organization

(3-3-4)

Introduces number systems, Boolean algebra, digital logic, computer arithmetic, instruction sets, memory, system software, and network organization and architecture. Laboratory exercises on digital logic, computer architecture, machine language and assembly language programming. Completion of a programming project.  
Corequisite: MATH 100.

### MIS 136 Object-Oriented Programming with C++

(3-3-4)

A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, mem-

ber functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed CST 136.  
Prerequisite: MIS 126, with grade "C" or better.

### MIS 206 Introduction to Management Information Systems

(3-0-3)

Introduction to key components in information systems. Identification of major hardware components and primary categories of software applications. Data resource management concepts; elements of how information systems work to support problem solving and business opportunities. Ethics of information systems usage.

### MIS 215 Business Application Programming

(3-3-4)

Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.  
Prerequisites: MIS 115 and MIS 275 with grade "C" or better, or instructor consent.

### MIS 218 Database Programming

(3-3-4)

Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.  
Pre-Req: MIS 275 and MIS 118 with a "C" or better.

### MIS 225 Business on the Internet

(3-3-4)

The role of the Internet and related technologies in modern business and electronic commerce. Hands on course for creating dynamic Web pages. Emphasizes Internet marketing and Web page editor with hypertext markup language (HTML) with some exposure to JavaScript.

### MIS 255 Health Informatics Concepts and Practices

(3-0-3)

The discipline of health informatics is introduced, including history, knowledge of health

informatics, data management, vocabularies, standards and tools as applied in the support of health care delivery. The course provides foundation knowledge and understanding of the impact of information technology on the health care industry and vice versa. Particular attention is paid to the design, usage and acceptance of information technology applications. This course introduces students to the concepts and practices of health informatics.

### **MIS 256 Hardware/Software Integration**

(3-3-4)

An overview of personal computer technology: comparing components such as display, CPU, memory units and peripherals. Setting standards for selecting, maintaining and supporting automated business information systems. Relationship of systems and applications software to available system software, hardware and selected peripherals. In-depth software comparison, user rating, security and error recovery techniques.

### **MIS 272 Fundamentals of Networking I**

(3-3-4)

Networking communications and essential LAN building blocks including network communications, Packet analysis, IP addressing, switches, routers, WAN technology, OSI model, client server applications, introduction to network security.

Prerequisite: MIS 256 with grade "C" or better.

### **MIS 273 Fundamentals of Networking II**

(3-3-4)

Introduces the fundamental skills required to install, configure and manage a network operating system. Topics covered include installing and configuring Active Directory, domain controllers, DNS, users and group definition, print queues, network roles and services and application servers.

Prerequisite: MIS 272.

### **MIS 275 Introduction to Relational Databases**

(2-3-3)

The relational model, DBMS functions, administration, design methodology, modeling and normalization. Hands-on design, development and use of an enterprise database system using SQL Server. SQL fundamentals will be introduced, covering select statements,

data manipulation, sub-queries, multi-table queries, functions and data types.

### **MIS 311 Introduction to Systems Analysis**

(3-0-3)

Introduction to state-of-the-art business information systems. Acquiring, processing and distributing information in a technological environment. The MIS organization: its place in business, key trends and implications. Introduction to computing hardware. Introduction to System Development Life Cycle.

Prerequisite: WRI 121.

### **MIS 312 Systems Analysis I**

(4-0-4)

Planning and Analysis phases of Systems Development Life Cycle. Focus on software development life cycles; entity relationships, data flow diagrams, prototyping and other forms of data or system modeling. Designing, selecting and installing new systems for end users. Includes cost/benefit and value-added evaluations.

Prerequisites: MIS 275 and MIS 311.

### **MIS 315 Computer Software Techniques**

(3-0-3)

Lectures are divided between data structures and operating systems. Data structures section involves data representation, B-trees, graphs, and files. Operating systems section involves process, memory, and file management as related to UNIX. Cannot be taken for graduation credit if student has completed CST 313.

Prerequisite: MIS 126 with grade "C" or better.

### **MIS 318 Advanced Programming**

(3-3-4)

Advanced survey of programming topics in areas such as Object Oriented, Data Mining, Business Intelligence and Web Scripting. Application will be emphasized through the development of software applications that provide business solutions. Prepares students with a strong programming background for upper division MIS courses.

Prerequisite: MIS 218 with a "C" or better.

### **MIS 322 Systems Analysis II**

(3-3-4)

Design, implementation and maintenance phases of Systems Development Life Cycle. Focus on software development life cycles.

Designing, selecting and installing new systems for end users. Includes cost/benefit and value-added evaluations. Define and perform data modeling, process modeling, network modeling and their importance.

Prerequisites: MIS 218 and MIS 312, both with grade "C" or better.

### **MIS 341 Relational Database Design I**

(3-3-4)

A comprehensive study of SQL and PL/SQL using the Oracle relational database management system. Hands-on training will include the use of PL/SQL and SQL\*PLUS, database creation, data queries, view definitions and use, operators and functions, triggers, calculations, indexing, cursors and data manipulation.

Prerequisites: MIS 215 with a "C" or better and MIS 312 with a "C" or better.

### **MIS 343 Relational Database Design III**

(2-3-3)

Install, create and maintain an Oracle database. Oracle database architecture and component interactions. Implement, configure and monitor an operational database in an effective manner including performance monitoring, database security, user management and backup/recovery techniques.

Prerequisite: MIS 342.

### **MIS 344 Business Intelligence**

(2-3-3)

Develop analytic solutions to gain functional understanding of Business Intelligence to solve business problems. Covers the development of Crystal Reports and Dash-boarding tools to develop reporting and interface solutions for business.

Prerequisite: MIS 341 with grade "C" or better.

### **MIS 345 Health Care Information Systems Management**

(3-0-3)

Information systems within healthcare organizations are examined. Business, clinical, and healthcare delivery processes are identified as they relate to data acquisition and information systems. Key issues confronting design, organization and management of healthcare systems are identified, examined, and solutions are explored and developed.

Prerequisites: BUS 317 and BUS 313.

**MIS 351 Enterprise Network Design I**

(3-3-4)

High-level design of primary network architectures employed in modern business networks. Design logical and physical models to create the network documentation required for modern information systems. Focus on the management, performance, scalability and reliability of the central data centers. Prerequisites: MIS 273, MIS 312 and WRI 227.

**MIS 352 Enterprise Network Design II**

(3-3-4)

Focus on management responsibilities inherent in enterprise networks. Includes project labs using network infrastructure to implement design goals and team projects. Prerequisite: MIS 351.

**MIS 353 Enterprise Network Design III**

Focus on management, performance, reliability, scalability, and security. Key topics covered include: WAN communication protocols, Web-based applications, business to business VPN services, distributed management for satellite campuses and virtualization of the enterprise information system. Prerequisite: MIS 352

**MIS 357 Information and Communication Systems in Health Care**

(2-3-3)

Addresses the role of computer-based information and communications systems in patient care and health care administration, including hands-on experience with the acquisition, storage and use of information in the electronic medical record and systems such as PACS, lab and pharmacy systems and computerized provider order entry (CPOE). Prerequisite: MIS 255.

**MIS 375 Decision Support Systems**

(2-3-3)

Use of personal computer application programs for analysis and reporting, problem solving and decision assistance. Prerequisites: MIS 102, MATH 361 and MATH 371.

**MIS 385 NoSQL**

(2-3-3)

Develop concepts and a fundamental skill set of NoSQL and document-oriented data

models. Conducting cross comparison between relational and document-oriented data models. Students will gain a broader understanding of DBA techniques used in managing database systems through replication and sharding approaches. Prerequisite: MIS 341 with a grade of a "C" or better.

**MIS 390, 490 Co-op Field Experience**

(Hours to be arranged each term.)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer type, level, and difficulty of the particular job must be approved by the student's advisor prior to the employment period. A written comprehensive report of activities must be submitted during the following term of residence. Prerequisites: All MIS 100 and 200 level courses.

**MIS 405 Reading and Conference**

(Hours to be arranged each term.)

**MIS 408 Workshop**

(Hours to be arranged each term.)

**MIS 414 Information Systems Development**

(2-3-3)

Review of systems analysis. Tools, techniques, and reference sources used to research, configure and justify the hardware, software, staff, and facilities required for a computer system. Changeover, file conversion and testing. Post-installation audit, backup, security and privacy. Prerequisites: MIS 312 and a programming language.

**MIS 442/542 Advanced Database Application Programming**

(3-3-4)

Construct graphical end-user interfaces for scalable, high-performance Internet applications. Building, testing, debugging and deploying interactive Internet applications that use an enterprise level Database Management System. Develops experience with the System Development Life Cycle (SDLC) for web/database integration for application development. Develop understanding and application of Software as a Service (SaaS). For graduate credit students will participate in a field placement project working with companies such as the BLM to create a work-

ing application demonstrating mastery of the subject material.

Prerequisites: MIS 218 and MIS 341, both with grade "C" or better.

**MIS 445 Legal, Ethical and Social Issues in Health Care Technology**

(3-0-3)

Legal, ethical, and social issues in health care, especially as they impact systems design, development, use, and management will be examined.

Prerequisites: MIS 345.

**MIS 479 Current Topics in Information Technology**

(3-0-3)

Advanced topics focusing on special interests and newly developed technology in IT. Concentration on a current subject such as client/server architecture, networking, telecommunications, database technology, programming, the Internet, ethics, security and privacy of information. Prerequisites: MIS 272, MIS 275 and WRI 227.

**MIS 496 Senior Project Management**

(3-3-4)

Focuses on project management. Includes best-known industry practices, as well as planning, organizing and managing resources to bring about successful completion of specific project goals and objectives. Produces formal proposal for Senior Project. Prerequisites: BUS 356, MIS 312, WRI 327. At least one programming class with grade "C" or better and all junior-level courses.

**MIS 497 Senior Project II**

(1-6-3)

Senior project students will plan, develop and carry through to completion a management information systems project for a client they select. Formal proposal, progress reports and project demonstration/presentation. The instructor serves as the student's consultant. Prerequisite: MIS 496 with grade "C" or better.

**MIS 498 Senior Project III**

(1-6-3)

Senior students plan, develop and complete a project for a client or an independent research project. Periodic progress reports and presentations required. Instructor functions as a consultant. Deliver final project. Prerequisite: MIS 497 with grade "C" or better.

## (MIT) Medical Imaging Technology

### MIT 103 Introduction to Medical Imaging

(3-0-3)

Orientation to the art and science of medical imaging. History and development of radiologic science, diagnostic medical sonography, vascular technology, nuclear medicine technology, medical ethics, health care industry, related professional organizations, and regulatory agencies.

### MIT 107, MIT 207, MIT 307, MIT 407 Seminar

(Hours to be arranged each term.)

### MIT 231 Sonographic Principles and Instrumentation I

(3-3-4)

Properties of sound waves, propagation and interaction of ultrasound in tissue, basic ultrasound instrumentation, static, and real time ultrasound imaging principles and artifacts are covered. Laboratory includes demonstration of wave characteristics and introduction to basic instrumentation of real-time ultrasound imaging. Satisfies Science elective.

Prerequisite: PHY 217 with grade "C" or better.

### MIT 232 Sonographic Principles and Instrumentation II

(3-3-4)

Advanced physical principles. Hemodynamics, Doppler physics, color imaging, and artifacts associated with them are covered. Digital signal and image processing and bioeffects are also discussed. Laboratory develops instrumentation skills. Satisfies Science elective.

Prerequisite: MIT 231 with grade "C" or better.

### MIT 260 Introduction to PACS

(3-0-3)

An introduction to PACS and how it has changed the medical work environment. Subjects covered include: EMR/RIS/PACS integration, evaluating the human computer interface, Dicom tools and viewers, archive media, PACS components, Moore's Law, PACS licensing, user impact and DICOM configuration.

### MIT 333 HIPAA for PACS/HI

(3-0-3)

Basic concepts of HIPAA, including consideration of how HIPAA affects patient information systems. Covers the three parts of HIPAA law, and the role of IT professionals who interact with patient data.

Prerequisite: MIT 103 or instructor permission.

### MIT 361 Advanced PACS

(3-0-3)

An advanced survey of PACS-based systems and technologies making up enterprise PACS. Topics include: number systems and data representation, computer architecture, database management systems, computer networks, health informatics workflow, DICOM and HL7.

Prerequisite: MIT 260 with grade "C" or better.

### MIT 362 PACS Networking

(3-0-3)

Study of principles and fundamentals of network based communication between PACS, Imaging Modalities and network related devices. The 7 layer communication model is studied as mapped to standard TCP/IP implementations. Layer 7 is approached in relevance to the DICOM standard packet definitions and DICOM information model. Prerequisite: MIT 260 with grade "C" or better.

### MIT 363 PACS DBMS

(3-0-3)

Study of principles and fundamental concepts characterizing data representation relevant to PACS systems. Topics covered include database basics, SQL, Normalization Techniques, DICOM information definitions. Project definitions are based on DICOM Standard as an information model.

Prerequisites: MIS 275, MIT 362 with grade "C" or better.

### MIT 374 Quality Assurance of Medical Images

(3-0-3)

An overview of the medical imaging modalities, focusing on image identification and acquisition, relative to basic quality control procedures and guidelines for a quality assurance program.

Prerequisites: BIO 200, BIO 233 with grade "C" or better.

## (MUS) Music

### MUS 107, MUS 207, MUS 307, MUS 407 Seminar

(Hours to be arranged each term.) H or HP

### MUS 195 Band

(0-3-1) HP (One hour each term.)

### MUS 197 Chorus

(0-3-1) HP (One hour each term.)

### (NMT) Nuclear Medicine Technology

### NMT 107, NMT 207, NMT 307, NMT 407 Seminar

(Hours to be arranged each term.)

### NMT 205 Nuclear Medicine Administration

(2-0-2)

Orientation to the principles of management, marketing nuclear medicine services, and administrative procedures.

Prerequisite: MIT 103 with grade "C" or better.

### NMT 212 Nuclear Medicine Physics/Radiation Biophysics

(3-0-3)

Interactions of radiation with matter. Introduction to the cellular and systemic responses to radiation. Early and late somatic and genetic effects described. Critical organ dose calculations risks versus benefits. Overview of film processors, associated chemistry.

### NMT 215 Radiochemistry and Radiopharmacy

(3-3-4)

The design and function of radionuclide generators, labeling procedures, sterility and pyrogenicity considerations, radionuclide and radiochemical quality control procedures.

Prerequisite: CHE 350 with grade "C" or better.

### NMT 217 Patient Care

(3-3-4)

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the nuclear medicine technologist in patient education.

Prerequisite: MIT 103.

**NMT 225 Nuclear Physics/  
Instrumentation**

(3-3-4)

An in-depth examination of the physics in nuclear medicine, principles of detection, considerations of counting and imaging, collimators, planar imaging and associated quality assurance and control. Use of all major instrumentation in Nuclear Medicine Departments.

Prerequisite: NMT 215 with grade "C" or better.

**NMT 256 Cardiovascular Imaging**

(3-0-3)

Introduction to Cardiovascular Imaging techniques in Nuclear Medicine including planar, SPECT, and PET imaging acquisition and processing protocols, radiopharmaceuticals, cardiac anatomy and physiology, exercise and pharmacological stress testing, and EKG principles.

Prerequisites: NMT 205, NMT 215, NMT 217.

**NMT 311 Imaging Procedures I**

(3-3-4)

Proper patient care before, during and after the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body organ imaging.

Prerequisite: NMT 225 with grade "C" or better.

**NMT 312 Imaging Procedures II**

(3-3-4)

Proper patient care before, during and after the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body and organ imaging.

Prerequisite: NMT 225 with grade "C" or better.

**NMT 313 Therapeutic Procedures  
and In-Vitro Studies**

(3-3-4)

Common therapeutic applications of radionuclides, dose ranges for each application, and proper techniques for calculating quantities of administered radiopharmaceuticals. Includes patient care, follow-up procedures and disposal of excreta. Body composition tests using In-Vitro techniques.

Prerequisite: NMT 312 with grade "C" or better.

**NMT 325 SPECT Imaging and  
Computer Applications**

(3-3-4)

Single photon emission computed tomography (SPECT) imaging and computer applications as applied to nuclear medicine imaging. Demonstration of computer techniques and ECG monitoring and interpretation.

Theoretic basis of computer operations and medical applications in nuclear medicine. Lab experience with computerized systems, including hospital sites.

Prerequisites: BIO 335 and NMT 312 with grade "C" or better.

**NMT 346 Magnetic Resonance**

(3-3-4)

Physics and principles used in the production of magnetic resonance images and spectroscopy. Static magnetic fields, gradient magnetic fields, secondary coil fields, nuclear magnetic resonance (NMR), spatial domain, frequency domain, computer data acquisition, relaxation times, pulse sequence diagrams. Laboratory simulation is included.

Prerequisites: NMT 225 and PHY 217 (or equivalent) with grade "C" or better.

**NMT 355 Computed Tomography**

(3-3-4)

X-ray physics, scanner components and data acquisition of computed tomography. Image reconstruction, manipulation and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis and musculoskeletal system. Laboratory simulator practice on image manipulation, scan post processing and reconstruction.

Prerequisite: NMT 311 with grade "C" or better.

Corequisites: NMT 367, BIO 335.

**NMT 367 PET Imaging**

(3-0-3)

Introduction to Position Emission Tomography (PET) imaging techniques including acquisition protocols, processing protocols, quality control procedures, radiation protection, patient screening, radiopharmaceuticals, image fusion, and imaging procedures.

Prerequisite: NMT 225 with grade "C" or better.

Corequisites: NMT 311 and NMT 346.

**NMT 388 Externship Preparation**

(3-0-3)

Review and summarize key concepts in Nuclear Medicine. Focus is on patient care and interpersonal scenarios the externship

student will likely face while in the hospital environment. Review and discussion of the NMT Externship Handbook and Procedures Log.

Prerequisites: Third quarter junior level status is required for this course.

**NMT 410 Nuclear Medicine  
Technology Externship**

(0-40-15)

All students must complete four consecutive terms (12 months) of clinical experience in nuclear medicine technology at an Oregon Tech approved site. Students will work under the direct supervision of a registered Nuclear Medicine Technologist.

Prerequisite: All NMT courses with grade "C" or better.

**NMT 445 Computed Tomography  
Clinical Experience**

(0-15-5)

All students must complete three consecutive terms (9 months) of clinical experience in computed tomography at a hospital or clinic of their choosing. Students will work under the direct supervision of an ARRT (CT) board registered technologist.

Prerequisite: ARRT and/or NMTCB registry in Nuclear Medicine Technology. Successful completion and faculty approval of Computed Tomography and Cross Sectional anatomy course.

**(PHED) Physical  
Education****PHED 100 Belly Dance: Beginning**

(0-3-1)

Experience an unique dance form. Students will learn basic hip, rib, and shoulder isolations and of course shimmys. All of this and more are done in combinations, and finally a choreographed dance.

**PHED 101 Belly Dance:  
Intermediate**

(0-3-1)

A continuation of the beginning class. More complex moves are introduced and more technical expertise is expected. Dancing with veils will be introduced. There will be more complex choreography and music. Dance experience is helpful.

**PHED 102 Zumba**

(0-3-1)

Zumba is an exhilarating, effective, easy to



follow, Latin inspired, calorie burning dance fitness party. Zumba classes feature exotic rhythms set to high energy Latin and international beats.

**PHED 107, PHED 307, PHED 407 Seminar**

(Hours to be arranged each term.)

**PHED 110 Boot Camp/Kick Boxing**  
(0-3-1)

This is a high-low workout with an emphasis on kickboxing (both Taebo and Turbo kickboxing), also included is body pump workouts, core ball as well as Winsor Pilates stretching.

**PHED 111 Core Strength and Balance**

(0-3-1)

BOSU ball training to improve balance and core strength and alleviate back pain and instability. This class includes full body training, using floor work, cardio circuits, and isometric exercises.

**PHED 112 Intro to Cardio and Core**  
(0-3-1)

A survey participation of cardiovascular group exercise using cardio kickboxing (including both Taebo and Turbo kickboxing), dance aerobics, and step aerobics.

**PHED 113 Super Circuit and Cardio Training**

(0-3-1)

This course is designed to use a combination of free weights and/or the universal machines, along with cardiovascular fitness to provide a comprehensive program to increase muscle strength and endurance.

**PHED 120 Pilates and Body Pump**  
(0-3-1)

Focus is the floor techniques developed by Joseph Pilates as well as ball Pilates/core strength training. Use of a core ball and body pump bar for anaerobic workout and tone.

**PHED 121 Total Fitness Conditioning I**

(0-3-1)

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to cardiovascular efficiency, body composition, muscular strength and endurance, and flexibility.

**PHED 122 Total Fitness Conditioning II**

(0-3-1)

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to body composition, muscular strength and endurance. Geared toward weight training workouts.

**PHED 123 Dancercise/Step Aerobics**

(0-3-1)

A combination of step aerobics and dance moves to provide a fat burning/cardiovascular workout.

**PHED 124 Weight Loss**

(0-3-1)

Introduction to weight loss and the wellness model. Develop a fitness program for basic nutrition and weight control. Lecture portion spent in the field and in the weight room/cardio room learning techniques and skills related to weight control.

**PHED 125 Weight Management Fitness**

(0-3-1)

Continuation of the Weight Loss class. Meant to reinforce commitment to fitness for participants. Includes 40-45 minutes cardio and 15 minutes of intense cardiovascular training and 20-30 minutes low cardiovascular training. No lecture on weight loss with this class.

**PHED 126 Body Pump and Core Ball Pilates**

(0-3-1)

A strength and endurance training workout involving intermittent cycles of cardio and weight training. Workouts intended to increase a person's metabolic rate as well as anaerobic fitness level.

**PHED 130 Rowing**

(0-3-1)

Learn the fundamentals of rowing in a multi-person racing shell with racing oars and sliding seats. Also covered will be rowing and race terminology, marine safety, and improving fitness. Good swimming skills required.

**PHED 131 Scuba: Beginning**

(1-3-2)

Entry-level course. 1 hour lecture and 2 pool sessions per week. Post-course students are eligible for NAUI certification dives. Consists

of 5 dives over two day period off-campus. No additional charge.

Prerequisite: must pass swim test.

**PHED 132 Scuba: Advanced**  
(1-3-2)

Learn diving in challenging environments. Six dives include night, navigation, and deep dives and three others (your choice). Dives on weekend's off-campus. Dive gear furnished. Included is certification to dive Oxygen enriched mixtures (Nitrox).

Prerequisite: PHED 131.

**PHED 141 Tai Chi for Circulation**  
(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. Practice includes various forms utilizing acupressure points and energy meridians that additionally will help facilitate health of heart and lungs, normalize blood pressure, and control blood sugar.

**PHED 142 Tai Chi for Internal Organs**

(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms will additionally utilize acupressure points and energy meridians to facilitate health of internal organs.

**PHED 143 Tai Chi and Qigong: Health, Bones, Muscle**

(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms that additionally will help maintain bone density, ward off arthritis, maximize joint flexibility, and strengthen muscles supporting joints.

**PHED 144 Tai Chi and Qigong: Neck/Back Strength**

(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms that additionally will strengthen neck and back, and help to prevent injury or heal from previous injuries.

**PHED 145 Relaxation and Flexibility**  
(0-3-1)

Explore Tai Chi and Qigong methods for stress reduction and facilitation of balance

and flexibility. Other stress reduction methods include autogenic training, progressive muscle relaxation, and self-hypnosis. Explore the impact of cardiorespiratory exercise and diet on stress management.

### **PHED 146 Yoga**

(0-3-1)

Class is generally Hatha Yoga, along with basic Ashitanga, and Kundalini Yoga techniques. In yoga a participant can hope to improve their flexibility, strength and balance.

### **PHED 150 Aikido**

(0-3-1)

A Japanese martial art reflecting the circular movements and energy transference found throughout the universe. Provides the necessary skills to train for practical and tough self-defense while building self-confidence, character, self-respect, and respect for others.

### **PHED 151 Karate**

(0-3-1)

Dive into the very heart and soul of Karate! Teachings in traditional forms, self-defense, and competitive style point sparring. Great for new and experienced students. Promotes physical activity, increased mobility, and awareness while learning a valuable life skill.

### **PHED 160 Cross Country Skiing: Beginning**

(0-3-1)

Explore clothing, equipment and learn to travel on cross country skis while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide experience to use for a lifetime.

### **PHED 161 Snowshoeing: Beginning**

(0-3-1)

Explore clothing, equipment and learn to snowshoe while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide an enjoyable and learning recreational experience to use for a lifetime.

### **PHED 162 Ice Skating**

(0-3-1)

Covers basic figure skating technique using U.S. Figure Skating adult teaching guidelines, levels 1 through 4. Skills include proper use of forward and backward edges, basic curves and turns, simple spins and integrated use of upper body and arm movements.

### **PHED 163 Wilderness Navigation**

(0-3-1)

Learn to read a map and utilize a compass. Gain skill to find precise wilderness locations. Learn the dangers of wilderness travel, and deal with those situations. Two field trips polish skills using map and compass to navigate.

### **PHED 170 Golf**

(0-3-1)

Lecture covers terminology, rules, etiquette, and course management. Practical class will cover putting, chipping, and driving.

### **PHED 171 Archery: Beginning**

(0-3-1)

Students learn basics of shooting a bow & arrow. Safety, form, mechanics, and practical basic skills. Classes meet off-campus. No prior experience required.

### **PHED 172 Archery: Intermediate**

(0-3-1)

Build upon basic skills learned in Beginning Archery. Advanced instruction in shooting, mechanics, and basic repairs offered. Classes meet off-campus.  
Prerequisite: PHED 171.

### **PHED 174 Recreational Basketball**

(0-3-1)

Basketball game played in a recreational environment. Emphasis on free play and team skill development. Most suitable for players with basic basketball skills.

### **PHED 175 Rugby**

(0-3-1)

Basic rugby skill, practice, and game play. Players of any skill level welcome. Participants should be able to engage in physical contact, strength development, endurance training, team practice, and game play.

### **PHED 180 Varsity Cross Country**

(0-3-1)

Competitive Cross Country for multi-level distance runners. Trail running, conditioning, strength training, psychological peak performance, nutrition, race tactics, running physiology and injury prevention is included. Participation in intercollegiate competition is included. Varsity athletes only or coaches approval.

### **PHED 181 Varsity Soccer**

(0-3-1)

Competitive Soccer at the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coaches approval.

### **PHED 182 Varsity Track/Field**

(0-3-1)

Competitive Track and Field techniques are covered including training, conditioning and team organization. Competition at the intercollegiate level. Varsity athletes only or coaches approval.

### **PHED 183 Varsity Men's Baseball**

(0-3-1)

Competitive Baseball on the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coaches approval.

### **PHED 184 Varsity Men's Basketball**

(0-3-1)

Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

### **PHED 185 Varsity Women's Basketball**

(0-3-1)

Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

### **PHED 186 Varsity Women's Softball**

(0-3-1)

Competitive Softball including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

### **PHED 187 Varsity Women's Volleyball**

(0-3-1)

Competitive Volleyball at the intercollegiate level including advanced technique analysis, offensive and defensive strategies, training, conditioning, and team organization. Varsity athletes only or coaches approval.

**PHED 188 Varsity Sport Strength/Conditioning**

(0-3-1)

This course provides instruction for sports specific conditioning for varsity athletes. This includes strength training, power training, speed and agility training, core training, dynamic flexibility, and specific energy system training. Varsity athletes only or instructor approval.

**PHED 190 Physical Education**

(0-3-1)

Service course. General participation in physical activities to promote sound health.

**PHED 201 Sports Seminar - Officiating**

(1-3-2)

This course includes rules, mechanics and officiating procedures in sports found in intercollegiate, interscholastic, and intramural programs. Practical experience in officiating will be provided.

**PHED 207 Major Sports Seminar**

(1-2-2)

Development of professional competencies in fundamentals of training methods and objectives of major sports.

**PHED 291 Lifeguard Training**

(1-2-2)

Basic skills of lifesaving in aquatic programs; American Red Cross Advanced Lifesaving Authorization.

**PHED 292 Water Safety Instructor**

(1-2-2)

Analysis, methods of instruction, and teaching of aquatic skills; American Red Cross Authorization in Water Safety Instruction.

**(PHIL) Philosophy****PHIL 107, PHIL 207, PHIL 307, PHIL 407 Seminar**

(Hours to be arranged each term.) H

**PHIL 331 Ethics in the Professions**

(3-0-3) H

Applied ethics course that focuses on examining ethical issues common to the professions, such as privacy, confidentiality, social responsibility and whistle-blowing. Emphasizes critical thinking and ethical decision-making skills.

Prerequisite: WRI 123 or WRI 227.

**PHIL 342 Business Ethics**

(3-0-3) H

Business ethics course that focuses on ethical issues commonly found in business, such as whistle-blowing, discrimination, finance and international manufacturing. Emphasizes critical thinking, critical reading and the importance of personal ethics.

Prerequisites: One previous Humanities course and WRI 122.

**(PHY) Physics****PHY 107, PHY 207, PHY 307, PHY 407 Seminar**

(Hours to be arranged each term.)

**PHY 201 General Physics**

(3-3-4)

An introduction to physics with study of Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section.

Prerequisite: MATH 112 with grade "C" or better.

**PHY 202 General Physics**

(3-3-4)

Temperature systems, heat, kinetic theory of gasses, introductory thermodynamics, and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section.

Prerequisite: PHY 201.

**PHY 203 General Physics**

(3-3-4)

Wave motion, sound, introduction to geometrical and physical optics, and topics from modern physics. All general physics students must register for a laboratory section.

Prerequisite: PHY 202.

**PHY 215 Topics in Astronomy**

(2-3-3)

Astronomy including a survey of the solar system, constellations, star characteristics, star groupings, galactic and extragalactic objects, stellar evolution, and instrumentation with emphasis on topics of maximum interest to the students.

Prerequisite: MATH 111.

**PHY 217 Physics of Medical Imaging**

(3-0-3)

An introduction to physics for MIT majors. Topics include: basic mechanics, basic

electrostatics, fundamentals of electronics, magnetism, sources and types of radiation, and image formation.

Prerequisite: MATH 112 with grade "C" or better.

**PHY 221 General Physics with Calculus**

(3-3-4)

Basic principles of physics with emphasis on applications of calculus. Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section.

Prerequisite: MATH 251 with grade "C" or better.

Corequisite: MATH 252.

**PHY 222 General Physics with Calculus**

(3-3-4)

Temperature systems, heat, kinetic theory of gasses, thermodynamics and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section.

Prerequisites: MATH 252, PHY 221.

**PHY 223 General Physics with Calculus**

(3-3-4)

Wave motion, sound, introduction to geometrical and physical optics, and selected topics from modern physics. All general physics students must register for a laboratory section.

Prerequisite: PHY 222.

**PHY 237 Meteorology**

(2-3-3)

Principles of atmospheric structure and movement; horizontal and vertical motions; air masses; micrometeorology; atmospheric diffusion in relation to air pollution.

Prerequisite: PHY 202 or PHY 222.

**PHY 311, PHY 312, PHY 313 Introduction to Modern Physics**

(3-0-3)

An introduction to physics of the 20th century, including selected topics from atomic and nuclear physics and quantum theory with applications in science and industry.

Prerequisite: PHY 203 or PHY 223.

**PHY 330 Electricity and Magnetism**  
(3-0-3)

A study of electromagnetic phenomena leading to and using Maxwell's equations. Topics will include static fields in vacuum and in dielectric media, electric and magnetic potentials, and the energy density of electromagnetic fields.

Prerequisites: MATH 254N, PHY 222.  
Corequisite: MATH 253N.

**PHY 410 Mathematical Methods: Fourier Optics**  
(3-0-3)

Linear systems, Fourier transforms, and their use in optics. Topics will include special functions, orthogonal expansions, Fourier series and transforms and spectra of functions, mathematical operators, convolution, autocorrelation, cross correlation, linear systems as filters, and signal processing.

Prerequisite: MATH 254N.

**(PSCI) Political Science****PSCI 107, PSCI 207, PSCI 307, PSCI 407 Seminar**

(Hours to be arranged each term.) SS

**PSCI 201 United States Government**  
(3-0-3) SS

Basic concepts and principles of the American political system.

**PSCI 250 Introduction to World Politics**  
(3-0-3) SS

Introduction to international relations and global issues. The rise and demise of the Cold War, international efforts towards arms control, and global environmental and economic problems.

Prerequisite: WRI 122.

**PSCI 326 World Politics in Transition**  
(3-0-3) SS

International relations theory and world politics in the post-Cold War period. Topics include changing great power relations, conflict management, global inequalities and transnational problems.

Prerequisite: PSCI 250.

**PSCI 355 International Conflict in the 20th Century**  
(3-0-3) SS

The functions, origins, and forms of war in the 20th Century examined in the context of political theory and history. Case studies include World War I, World War II, Korea, Vietnam, and the Persian Gulf War.

Prerequisite: PSCI 250.

**PSCI 497 United States Foreign Policy**  
(3-0-3) SS

The American foreign policy process, recurring themes in U.S. foreign policy, and the content of U.S. policy in such areas as Europe, Latin America, and the Middle East.

Prerequisite: PSCI 250.

**(PSG) Polysomnographic Technology****PSG 107, PSG 207 Seminar**

(Hours to be arranged each term.)

**PSG 211 Fundamentals of PSG and Patient Care**  
(3-0-3)

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing universal precautions. Role of the polysomnographic technologist in patient education. Ethical and legal issues.

**PSG 221 Physiology of Sleep**  
(3-0-3)

Introduction to sleep architecture and the function of changes in electroencephalograms, electrocardiograms, and electromyograms. Physiology of sleep-induced alterations in pharyngeal muscle tone, autonomic control and polysomnographic staging.

**PSG 231 Sleep Disorders Pathology**  
(4-0-4)

Normal and abnormal sleep disorders integrating the physiological functions of the nervous, respiratory, and cardiovascular systems. Emphasis on basic sleep sciences, physiology, diagnosis and treatment of sleep disorders.

Prerequisite: PSG 221.

**PSG 246 Sleep Disorders in Women**  
(3-0-3)

In-depth study of sleep disorders in women exploring: the menstrual cycle; circadian rhythms and shiftworking women; polycystic ovary syndrome; endometriosis, fibromyalgia; breast cancer and fatigue; pregnancy and sleep-disordered breathing; insomnia and other medically related sleep disturbances.

**PSG 264 Pediatric/Neonatal Polysomnography**  
(4-0-4)

Presentation of theory and its practical applications in pediatric and neonatal respiratory diseases and other sleep disorders. Includes pathophysiology, etiology, patient testing, scoring and treatment.

Prerequisite: PSG 221 or RPSGT licensed.

**PSG 271A Clinical Polysomnographic Technology Part A**

(2-12-6)

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hook-ups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 night-time clinical hours weekly.

Pre-or-corequisite: PSG 211.

**PSG 271B Clinical Polysomnographic Technology Part B**

(2-12-6)

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hook-ups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 night-time clinical hours weekly.

Prerequisite: PSG 271A.

**PSG 271C Clinical Polysomnographic Technology Part C**

(2-12-6)

Advanced aspects of polysomnographic technology including recognition of sleep

disorders, recording and monitoring, therapeutic interventions, scoring, MSLT, RTSW and neurophysiology interpretation of sleep. Part-time students only, requires 18 daytime clinical hours weekly.  
Prerequisite: PSG 271B.

### **PSG 272 Clinical Polysomnographic Technology I**

(2-27-9)

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hook-ups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Requires 27 clinical hours weekly at night in the lab.

Pre- or corequisite: PSG 211.

### **PSG 273 Clinical Polysomnographic Technology II**

(2-27-9)

Advanced aspects of polysomnographic technology including recognition of sleep disorders, recording and monitoring, therapeutic interventions, scoring, Multiple Sleep Latency Test, Repeated Test of Sustained Wakefulness and neurophysiology interpretation of sleep. Requires 27 clinical hours weekly during the day and night.

Prerequisite: PSG 272.

### **PSG 291 Clinical Sleep Educator**

(3-0-3)

Examination of the sleep technologist's increasing involvement in the identification, treatment and long-term monitoring of patients presenting with insomnia, sleep apnea, and poor sleep hygiene. Review of the Clinical Sleep Educator certificate offered by the BRPT.

Prerequisites: PSG 231 or liscenced RPSGT

## **(PSY) Psychology**

### **PSY 107, PSY 207, PSY 307, PSY 407 Seminar**

(Hours to be arranged each term.) SS

### **PSY 110 Human Services Careers**

(1-0-1) SS

Presentation and discussion of career options of psychology majors.

### **PSY 201 Psychology**

(3-0-3) SS

Introduction to the principles and applica-

tions of psychology. Topics include scientific methodology, learning, memory and cognitive processes.

### **PSY 202 Psychology**

(3-0-3) SS

Introduction to the principles and applications of psychology. Topics include the brain and behavior, consciousness, sensation and perception and health psychology.

### **PSY 203 Psychology**

(3-0-3) SS

Introduction to the principles and applications of psychology. Topics include social psychology, personality, maladjustment and psychotherapy.

### **PSY 215 Abnormal Psychology I**

(3-0-3) SS

Overview of biological, psychological, and social causes of abnormal behavior. Specific topics include models, classification and assessment of abnormal behavior, as well as anxiety, somatoform, dissociative, personality, impulse, alcohol and substance abuse disorders.

Prerequisite: PSY 203 or instructor consent.

### **PSY 216 Abnormal Psychology II**

(3-0-3) SS

Overview of legal and ethical issues related to abnormal psychology. Techniques of group and individual therapy. Specific disorders include: sexual and gender identity, mood, schizophrenia, cognitive, and childhood and adolescence.

Prerequisite: PSY 215 or instructor consent.

### **PSY 220 Community Psychology**

(3-0-3) SS

Community mental health, epidemiology, program evaluation and social ecology. Research, theory and practice in community settings. The influence of community-environmental factors in individual functioning and their utilization to promote mental health.

Prerequisite: PSY 203.

### **PSY 301 Basic Counseling Techniques**

(3-3-4) SS

Basic counseling and interpersonal skills, including reflective listening, expressing empathy, questioning, and confrontation are taught. Complex skills such as goal setting, documentation, suicide/ homicide crisis intervention, and handling client noncompli-

ance. Laboratory employs CD-ROM and role-play formats.

Prerequisite: PSY 216.

### **PSY 308 Psychology of Eating**

(3-0-3) SS

Exploration of eating behavior. Psychological, social, and physiological factors will be examined. Application of empirical data to real world experiences. Typical, healthy, and disordered eating behaviors will be considered.

### **PSY 311 Human Growth and Development I**

(3-0-3) SS

A biosocial study of human development from conception to adolescence. Discusses the biological and social processes (e.g., cognition, personality, emotion, and social) affecting the developing child. Applications to health care, family, and education are discussed.

Prerequisite: PSY 201.

### **PSY 312 Human Growth and Development II**

(3-0-3) SS

The psychological study of the continuing development of the human being from adolescence through old age and death. Discussion focuses on the social and health care issues of adulthood. Applications to health care, family and social policy.

Prerequisite: PSY 201.

### **PSY 313 Psychological Research Methods I**

(3-3-4) SS

Overview of the techniques of research in psychology. Emphasis placed on evaluating psychological measurements, reliability and validity, and interpretation of psychological data. Reviews sources of invalidity and techniques for minimizing these sources.

Prerequisites: PSY 203, MATH 243 or MATH 361, each with grade "C" or better.

### **PSY 314 Psychological Research Methods II**

(3-3-4) SS

Overview of the techniques of research in psychology. Emphasis placed on techniques of quantitative research. Review of experimental, quasi-experimental, field and survey research methods.

Prerequisite: PSY 313.

**PSY 317 Field Placement Seminar**  
(2-0-2) SS

Presentations and discussions of externship and placement sites, including related skill sets.

**PSY 321, PSY 322 Theories of Personality**

(3-0-3) SS

In-depth coverage of personality theories in terms of each theorist's personal experiences and the theories' major concepts and definitions of mental illness and treatment. Applications of various theoretical concepts to case studies and to people in their personal lives.

Prerequisite: PSY 201, PSY 202 or PSY 203.

**PSY 325 Stress Management**

(3-3-4) SS

Discussion of the concept of stress and its physical and psychological impact. Description of the physical and psychological stress reactions, stress related disease processes and techniques of stress management.

Prerequisite: PSY 201, PSY 202 or PSY 203.

**PSY 330 Social Psychology I**

(3-0-3) SS

Surveys behavior and experience in a social context. Topics include the self in the social world, attribution, social cognition, affiliation and romantic relationships. Theory, research and application discussed.

Prerequisite: PSY 201 or PSY 203.

**PSY 331 Social Psychology II**

(3-0-3) SS

Surveys behavior and experience in a social context. Topics include social influence, attitudes and persuasion, aggression, group dynamics, altruism and stereotyping/prejudice/discrimination. Theory, research and application discussed.

Prerequisite: PSY 330.

**PSY 334 Behavior Modification I**

(3-3-4) SS

Measurement of behavior and key concepts of operant learning are covered, e.g., reinforcement, extinction, punishment, stimulus control and shaping, among others. Laboratory exercises are interactive computer simulations of these concepts. First in four course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant

Analyst Examination®. Applicants will have to meet additional requirements to qualify. Prerequisite: PSY 203.

**PSY 335 Behavior Modification II**

(3-3-4) SS

Principles learned in PSY 334 are applied to the study of human behavior. Complex techniques and new learning concepts found in the "real world" are also covered. Treatment plans for actual human problem behaviors are created in the laboratory. Second in four course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify. Prerequisite: PSY 334.

**PSY 336 Health Psychology I**

(3-0-3) SS

The scientific study of behavior, thoughts, attitudes, and beliefs related to health and illness. Specific areas covered include: stress, realities of health care delivery, research methods, and patient demographics.

**PSY 337 Health Psychology II**

(3-0-3) SS

The scientific study of behavior, thoughts, attitudes, and beliefs related to health and illness. Specific areas covered include: substance abuse, alcohol problems, eating disorders, AIDS, coronary health, pain, chronic illness, pediatric health, and health problems of aging.

Prerequisite: PSY 336.

**PSY 339 Biopsychology**

(3-0-3) SS

Anatomical and physiological basis of behavior patterns presented from genetic, developmental, evolutionary and functional evidence. Discussions of mind-body relationships, senses, sleep, motor activity, emotions, and reproduction.

Prerequisite: PSY 202 or BIO 232 or instructor consent.

**PSY 341 Psychoactive Drugs I: Psychiatric Drugs**

(3-0-3) SS

Physiological, behavioral, social, and societal effects of psychiatric drugs including anti-anxiety, anti-depressant, and anti-psychotic drugs.

Prerequisites: PSY 202 and PSY 216.

**PSY 342 Psychoactive Drugs II: Abused Drugs**

(3-0-3) SS

Physiological, behavioral, social, and societal effects of abused drugs including alcohol, hallucinogens, marijuana, opiates, and stimulants.

Prerequisite: PSY 341.

**PSY 345, Educational Psychology I**

3-0-3 SS

Introduction to psychological concepts, theories, and methodologies as applied to education. Focus will be on the major psychological views of learning and how these can be applied to create effective strategies and environments for teaching and learning.

Prerequisite: PSY 201, 202 or 203.

**PSY 346, Educational Psychology II**

3-0-3 SS

Exploration of psychological principles and theories of teaching and learning. Focus will be on learner motivation, differences, needs, culture, and diversity. How to shape supportive learning environments and form comprehensive teaching will be considered, as will assessment of learning.

Prerequisite: PSY 201, 202 or 203

**PSY 347 Organizational Behavior**

(3-0-3) SS

Psychology applied to business organization and operations as they affect employees, customers, and the community with particular interest on group processes.

Prerequisite: Junior standing or instructor consent.

**PSY 351 Cognitive Restructuring I**

(3-3-4) SS

Philosophy behind criminal thinking errors, which influence their thought patterns. Laboratory component includes participation in client groups and casework.

Prerequisite: PSY 301 or PSY 334.

**PSY 352 Cognitive Restructuring II**

(3-3-4) SS

Analysis of thought patterns which cause behaviors leading clients to mandated counseling. Laboratory component includes participation in client groups and casework.

Prerequisite: PSY 351.

**PSY 355 Evolutionary Psychology**

(3-0-3) SS

Examination of biological determinants underlying human behavior. Discusses family

relations, aggression, crime, mating and other social aspects with regard to adaptation and fitness.

Prerequisite: BIO 103, or BIO 213, or PSY 203, or instructor consent.

### **PSY 356 Military Psychology**

(3-0-3) SS

Examination of the mental health and environmental issues facing current and former service members and Their families by exploring military culture, theory, assessment, and evidence based interventions.

Prerequisite: PSY 201, 202, or 203.

### **PSY 358 Psychology of Gender**

(3-0-3) SS

Psychological examination of the functioning, specialization, self-concept, and roles of women and men. Issues that women and men face in the gendered world are critically analyzed scientifically and experientially.

Prerequisite: PSY 201, PSY 202, or PSY 203.

### **PSY 360 Organizational Psychology**

(3-0-3) SS

Psychology applied to human relations problems in the work world. Specific topics include job satisfaction, motivation, leadership, attitudes and effects of stress on employees and job performance.

Prerequisite: PSY 201.

### **PSY 361 Industrial Psychology**

(3-0-3) SS

Application of psychological principles, theories and behavioral techniques applied to human relations, problems in industrial situations.

Prerequisite: PSY 201, PSY 202 or PSY 203.

### **PSY 364 Environmental Psychology**

(3-0-3) SS

Analysis of the interaction between human behavior and the environment. Discussions focus on how the environment affects humans and how our behavior influences the environment. Topics include environmental stress, architecture, perceptions and attitudes, and behavior to save the environment.

Prerequisite: PSY 201.

### **PSY 371 Human Sexuality I**

(3-0-3) SS

Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: theory and research, gender, anatomy and functioning, and hu-

man relationship components, including love and communication.

Prerequisite: PSY 201, PSY 202, or PSY 203.

### **PSY 372 Human Sexuality II**

(3-0-3) SS

Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: sexual orientation, pregnancy, contraceptive practices, sexual dysfunctions, sexually transmitted infections, paraphilias, sexual assault, media images, the sale of sex.

Pre- or corequisite: PSY 371.

### **PSY 376 Foundations of Sport Psychology**

(3-0-3) SS

Introduction to the foundations of psychology in the sport and physical activity domain. Focus will be on current theories, empirical research, and practices in the field of sport and exercise psychology.

Prerequisite: PSY 201, 202, or 203.

### **PSY 401 Advanced Counseling Techniques**

(3-3-4) SS

Major schools of psychotherapy are discussed. Students practice related techniques in the laboratory following demonstration and instruction. Group therapy techniques are emphasized with associated laboratory work using interactive CDROM, group therapy videotapes, and a Web site corresponding to readings.

Prerequisite: PSY 301.

### **PSY 402 Applied Psychology Methods II**

(3-3-4) SS

Skills training in paraprofessional counseling and assessment techniques, program development and evaluation. Interviewing, evaluation procedures, consultation, referral, seminar development and delivery are included. Individualized instruction and supervision of individual projects. Role-playing of helping skills is a major focus.

Prerequisite: PSY 401.

### **PSY 403 Applied Psychology Methods III**

(2-6-4) SS

Focus on application of skills and knowledge acquired in Methods I and II courses. Practicumlike experience of supervised implementation of projects created in PSY 402 (e.g.,

seminar delivery), or other participation in an established program, either on or off campus.

Prerequisite: PSY 402.

### **PSY 410 Organizational Change and Development**

(3-0-3) SS

Theories and processes necessary to understand and implement change within organizations. Focuses on impact of technological change in organizations and on skill development in planning, implementing and evaluating change.

### **PSY 416 Abnormal Behavior of Children and Adolescents**

(3-0-3) SS

Highlights differences between children and adults in their expression of emotional and interpersonal problems. Language/learning disabilities, problems of attention deficit, school refusal and separation anxiety, depression, and eating. Description of symptoms and treatments are emphasized.

Prerequisites: PSY 215, PSY 216, PSY 311, PSY 312.

### **PSY 420 Applied Psychology Externship**

(4, 8, 12 or 16 credit hours) SS

Opportunities to work under supervision in applied settings related to students' career interests. Students apply the knowledge they acquired in their classes and gain experience working in the field.

Prerequisites: PSY 301 with grade "C" or better and PSY 317 with grade "B" or better. Approval of the externship coordinator and completion of at least 120 hours of college credit.

### **PSY 421 Senior Project I**

(1-6-3) SS

First term of a a three-term comprehensive project in applied psychology. Focus on refining a research project, literature review and formulation of research question.

Prerequisite: PSY 313.

### **PSY 422 Senior Project II**

(1-6-3) SS

Second term of a three-term comprehensive project in applied psychology. Focus on development of research methodology and pilot testing of project.

Prerequisite: PSY 421.

**PSY 423 Senior Project III**

(1-6-3) SS

Third term of a three-term comprehensive project in applied psychology. Focus on data collection, writing of research report and oral presentation of project.

Prerequisite: PSY 422.

**PSY 428 Animal Behavior**

(3-0-3) SS

The biological foundations of animal behavior are presented from an ethological and comparative psychology perspective. Emphasizes the evolution, development, and physiological basis of behavior patterns and presents topics on learning, perception, orientation, communication, and social behavior. (Cannot be taken for graduation credit by students who have taken BIO 428.)

Prerequisite: PSY 202 or BIO 213.

**PSY 431 Family Therapy**

(3-0-3) SS

Basic differences between functional and dysfunctional families. Theoretical underpinnings of family therapy, an emphasis on particular theoretical models, different family populations including single parent families, blended families and culturally diverse families.

Prerequisite: PSY 301.

**PSY 432 Group Therapy**

(3-3-4) SS

Theory and application of group therapy techniques. Historical and current applications of group treatment, special populations and multicultural considerations.

Prerequisite: PSY 301.

**PSY 434 Advanced Behavior****Modification I**

(4-0-4) SS

Ethical principles and issues in Applied Behavior Analysis, the methods for measuring and evaluating behavior change, specifically single-subject research designs and behavioral assessment methods and techniques. Third in four course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 313. Pre- or corequisite: PSY 335.

**PSY 435 Advanced Behavior Modification II**

(4-0-4) SS

Application of principles and techniques of Applied Behavior Analysis to change behavior and develop systems to support behavior change. Fourth in four course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 434.

**PSY 446 Psychological Trauma**

(3-0-3) SS

Explores and introduces student to psychologically traumatic experiences in terms of definition, impact and reactions, including assessment and treatment of trauma-related psychological problems. Special focus on post-traumatic stress disorder.

Prerequisites: PSY 301.

**PSY 456 Performance Management**

(3-0-3) SS

Applications of Applied Behavior Analysis in business, industry and government. Includes proposal to identify and intervene with real-life performance problem.

Prerequisite: PSY 335.

**PSY 464 Organizational Structure**

(3-0-3) SS

Analysis of how organizations divide work to employees and then coordinate across employees. Describes how organizational structure changes with changing conditions.

Prerequisite: PSY 361.

**PSY 480 Theories of Learning**

(4-0-4) SS

The basics of the major learning theories as they apply to operant and respondent conditioning, social learning, and memory.

Prerequisite: PSY 335.

**PSY 485, Education Assistantship**

3-0-3 SS

Hands on exploration of educational functions with a wide range of possible ages and abilities; will involve tutoring and mentoring with additional specific duties dependent on the goals of each student.

Prerequisite: Requires Instructor Approval

**PSY 497 Special Projects/Training**

(Variable Credit 1 - 6) SS

Students may enroll for credit in special programs offered by external agencies, approved by the department, leading to the development of specialized skills. Programs may include training to work with special populations. May be taken twice for credit. Prerequisite: Senior standing in Applied Psychology and permission of HSS department chair.

**PSY 499 Independent Study**

(Variable Credit 1-6) SS

Intensive self-study of a topic in psychology of the student's choosing. Study guided by any professor in the Applied Psychology program. May be repeated, with different topics, up to three times.

Prerequisite: Senior standing in Applied Psychology and permission of HSS department chair.

**(RCP) Respiratory Care Program****RCP 100 Introduction to Respiratory Care**

(2-0-2)

A survey of the development of respiratory care including an introduction to quality and evidence-based respiratory care, patient safety, communication, recordkeeping, principles of infection control, medical ethics, physical principles and computer applications in respiratory care.

**RCP 107, RCP 207, RCP 307, RCP 407 Seminar**

(Hours to be arranged each term.)

**RCP 120 Interventions in Gas Exchange**

(4-0-4)

An introduction to the effects of ineffective breathing on carbon dioxide removal and oxygen delivery. Basic pulmonary mechanics are described. The vascular effects of hypoxemia are fully explored. Oxygen therapy and Continuous Positive Airway Pressure are introduced.

**RCP 221 Introduction to Patient Assessment**

(3-0-3)

Acquisition and interpretation of the patient history, physical examination, auscultation,



vital signs, laboratory data including arterial blood gases and dysrhythmia recognition. Collaborative activities include the acquisition, analysis and communication of findings. Prerequisite: RCP 236.

### **RCP 223 Emergent Chest Radiographic Interpretation**

(2-0-2)

The evaluation of the chest radiograph in the intensive care setting. Students learn to identify structures and fissures as well as the significance of silhouette sign, blunted costophrenic angles, air bronchograms and hyperlucency. The identification of pneumothorax, infiltrates, and the correct placement of tubes is required.

Prerequisite: RCP 236.

### **RCP 231 Pulmonary Physiology**

(3-3-4)

Pulmonary physiology including mechanics of ventilation, gas diffusion, acid-base regulation, oxygenation, and the physiologic advantage of structure. Gas laws and surface tension as applied to the understanding of clinical problems.

Prerequisite: BIO 233.

### **RCP 235 Arterial Blood Gases**

(3-0-3)

Chemistry and classification of acid-base balance including determination of compensation and pathophysiologic causes. Assessment of partial pressures of oxygen, saturation and total oxygen delivery.

Prerequisite: Acceptance into Respiratory Care Program or instructor consent.

### **RCP 236 Cardiopulmonary Dynamics**

(2-3-3)

Exploration of pulmonary mechanics as measured by spirometry. Cardiovascular hemodynamics including cardiac electrophysiology, rhythm recognition and the measurement and interpretation of Systemic Vascular Resistance and Pulmonary Vascular Resistance, Central Venous Pressures, Pulmonary Artery and Pulmonary Capillary Wedge Pressures.

Prerequisite: Acceptance into Respiratory Care Program or instructor consent.

### **RCP 241 Respiratory Gas Therapeutics**

(3-3-4)

Physical and chemical applications of medical gases and humidity therapy to patient care.

The transportation, regulation and dissemination of compressed gases. Clinical decision-making strategies for Oxygen titration.

Prerequisite: Admission to Respiratory Care Program.

### **RCP 252 Cardiopulmonary Pharmacology**

(4-0-4)

A study of the administration, pharmacokinetics, administration and actions of medications. Emphasis is placed on bronchodilators, steroids, mukolytics and antileukotriene agents. Vasoactive, antiarrhythmics, diuretics, sedatives, antimicrobials and neuromuscular blocking agents are introduced.

Prerequisite: CHE 360.

### **RCP 326 Disaster Preparedness**

(1-0-1)

Preparation for unusual biological disasters. Case-based instruction on anthrax, SARS, influenza, bird flu, tuberculosis, emergency room hospital violence and unrest, evacuation and loss of services caused by hurricanes, floods and fire.

Prerequisite: RCP 235.

### **RCP 335 Exercise Physiology and Education**

(2-0-2)

Introduction to the physiology of exercise, exercise in disease and health and stress testing. Concepts of age appropriate pulmonary rehabilitation and asthma education are described.

Prerequisite: RCP 235.

### **RCP 336 Hyperinflation Therapies**

(2-3-3)

Study and evidence-based application of PEEP, CPAP, bi-level ventilation, IPPB, and incentive spirometry. Flutter valve, PEP, high frequency chest wall oscillation and other methods of improving bronchial hygiene and lung volume.

Prerequisite: RCP 241.

### **RCP 337 Pulmonary Pathology**

(4-0-4)

Case-based approach to the understanding, evaluation and treatment of pulmonary disease. Recognition of obstructive and restrictive disease patterns as well as the classification of acid-base and oxygenation disorders. Classification, application and pharmacodynamics of common pulmonary

medications are discussed.

Prerequisite: RCP 235.

### **RCP 345 Cardiopulmonary Diagnosis and Monitoring**

(2-3-3)

Collaborative investigation, practice, calibration and interpretation of spirometry, body plethysmography, diffusion capacity, helium dilution, seven minute nitrogen washout, cardiopulmonary stress testing, 12 lead ECG acquisition, dysrhythmia recognition, arterial blood gas instrumentation.

Prerequisite: RCP 337.

### **RCP 350 Introduction to Clinical**

(1-24-9)

Orientation to clinical practice in hospitals. Requires successful criminal background check, drug screening, completion of training in computer charting and compliance with Health Insurance Portability and Accounting Act (HIPAA). Competence developed in the area of basic patient assessment, oxygen therapy, aerosol therapy and mechanical ventilation.

Prerequisite: RCP 241.

### **RCP 351 Mechanical Ventilation I**

(3-3-4)

Study of an array of artificial airways. Includes laboratory practice in intubation, endotracheal suctioning and bag-mask-valve ventilation. Study and practice of mechanical ventilation circuits, classes of mechanical ventilators and modes.

Prerequisite: RCP 235.

### **RCP 352 Mechanical Ventilation II**

(3-3-4)

Description and analysis of the adult patient-mechanical ventilator system including the initiation, assessment, management and discontinuance.

Prerequisite: RCP 351.

### **RCP 353 Mechanical Ventilation III**

(3-3-4)

Advanced topics in mechanical ventilation including transport, dual modes, neonatal and pediatric mechanical ventilation.

Prerequisite: RCP 352.

### **RCP 366 Clinical Simulation**

(3-0-3)

The practice and measurement of critical thinking in the context of computer branching logic simulations. Students use organized

sequential topical examinations to review and measure retention of respiratory care content. Passage of secure national review examination required.

Prerequisite: RCP 337.

### **RCP 386 Critical Care I**

(4-0-4)

Analysis and application of critical care techniques with an emphasis in cardiovascular management and assessment. Cardiovascular catheters and hemodynamics, advanced rhythm recognition, and the essentials of advanced cardiac life support.

Prerequisite: RCP 337.

### **RCP 387 Critical Care II**

(2-0-2)

Advanced techniques during intubation. Assessment of the difficult airway including Mallampatti classification and thyromental distance. Continued practice and an extension of hemodynamic, pharmacology and imaging knowledge. Students practice anticipating care based on nutritional status.

Prerequisite: RCP 241.

### **RCP 388 Advanced Neonatal Respiratory Care**

(3-3-4)

Survey of perinatal physiology with an emphasis on mechanical ventilation, the application of oxygen, medications, positive pressure, resuscitative efforts and evaluations as applied to the neonatal and pediatric patients. Instruction in neonatal resuscitation meets the standards established by the American Academy of Pediatrics.

Prerequisite: RCP 241.

### **RCP 389 International Neonatology**

(3-3-4)

Advanced topics in neonatal and pediatric respiratory care including transport, stabilization and care in resource limited international settings.

Prerequisite: RCP 241.

### **RCP 440 Case Management/Credentials I**

(3-0-3)

Current clinical cases used as the basis for scholarly research and discussion. Students design a research-based senior project in the field of respiratory care, including interviews, research, literature review and formal presentation. National examination required.

Prerequisite: Completion of all academic

coursework in the Respiratory Care Program prior to the senior year.

### **RCP 441 Case Management/Credentials II**

(3-0-3)

Current clinical cases used as the basis for scholarly research and discussion. Students continue work on senior project in the field of respiratory care, including interviews, research, literature review and formal presentation. National examination required.

Prerequisite: RCP 440.

### **RCP 442 Case Management/Credentials III**

(3-0-3)

Current clinical cases used as the basis for scholarly research and discussion. Students complete work on senior project in the fields of respiratory care, including formal presentation of the project. Passage of two national examinations required.

Prerequisite: RCP 441.

### **RCP 450, RCP 451, RCP 452 Clinical Care I, II, III**

(1-24-9)(1-24-9)(0-36-12)

Continued development of respiratory care skills, mechanical ventilation and neonatal intensive care, expanded functions and observations in specialty areas.

Prerequisite: RCP 450 for RCP 451, RCP 451 for RCP 452.

### **RCP 486 Extreme Physiology**

(2-0-2)

Physiologic adaptations to gas exchange and transport which occurs during the challenges of neonatal transition, exercise, high altitude and high-pressure environments.

Prerequisite: RRT credential and admission to degree completion program.

### **RCP 487 Expert Mechanical Ventilation**

(2-0-2)

Recognition of levels of quality in mechanical ventilation. Practicing clinicians balance experience with current evidence-based recommendations for mechanical ventilation in order to develop a hierarchy of quality care. Includes selection of new modes, patient-ventilator synchrony, the reduction of medical errors and ventilator associated pneumonia.

Prerequisite: RRT credential and admission to degree completion program.

### **RCP 488 Respiratory Care Innovations**

(2-0-2)

Exploration of new opportunities to improve access to respiratory care. Reduction of disease through the expansion of respiratory care. Student projects focused on networking among students and faculty and across institutional, professional and nonprofit lines to implement improvements in health and education.

Prerequisite: RRT credential and admission to degree completion program.

## **(RDSC) Radiologic Science**

### **RDSC 105 Radiation Protection and Radiographic Quality Control**

(3-0-3)

Principles of radiation protection and radiographic quality control for veterinary x-ray operators in accordance with Oregon Administrative Rules. Students majoring in Radiologic Science are not eligible.

### **RDSC 107, RDSC 207, RDSC 307, RDSC 407 Seminar**

(Hours to be arranged each term.)

### **RDSC 201 Imaging Techniques I**

(3-3-4)

Demonstration and practice with the phenomena and causes of image formation and visualization. The context includes studies of effects of technique-factor changes, effects of the use of various accessories and effects of chemicals in film processing. Causes of radiographic artifacts are discussed and explored. Includes the study of interactions of radiation and matter.

Prerequisite: MIT 103 with grade "C" or better.

### **RDSC 202 Imaging Techniques II**

(3-3-4)

Radiographic principles and principles of radiographic quality. Study of theory and practice in methods of protection against ionizing radiation.

Prerequisite: RDSC 201 with grade "C" or better.

### **RDSC 205 Patient Care**

(3-3-4)

Basic concepts of patient care, including consideration of physical and psychological

needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the radiographer in patient education.

Prerequisite: MIT 103.

### **RDSC 210 Radiographic Positioning I**

(3-3-4)

Demonstration and practice of the routine and special radiographic positions of bones of the upper and lower extremities excluding the shoulder and pelvic girdles.

Prerequisites: RDSC 201 and RDSC 235 with grade "C" or better.

### **RDSC 211 Radiographic Positioning II**

(3-3-4)

Demonstration and practice of routine and special radiographic positions of the axial skeleton, shoulder, and pelvic girdles.

Prerequisites: RDSC 202, RDSC 210, and RDSC 235 with grade "C" or better.

### **RDSC 233 Contrast Media Procedures**

(3-3-4)

Routine radiographic examinations of the urinary system, gastrointestinal biliary system, respiratory system, and nervous system, using various contrast medias and filming techniques. All radiographically significant anatomy, physiology, pathology, terminology, and topography, including all contrast studies of these systems.

Prerequisites: RDSC 202, RDSC 210, RDSC 235 with grade "C" or better.

### **RDSC 235 Equipment Operation and Maintenance**

(3-0-3)

Basic components and operation of radiographic, fluoroscopic, and mobile units. Evaluation, calibration, and maintenance of radiographic equipment and accessories.

### **RDSC 272 Radiation Protection**

(3-0-3)

Basic properties, sources, units of measurement, dosimetry, and biological effects of radiation. Methods of personnel protection and minimizing patient exposure. NCRP recommendations for protective devices and personnel monitoring.

Prerequisites: RDSC 201 and RDSC 235 with grade "C" or better.

### **RDSC 301 Radiographic Positioning III**

(3-3-4)

Demonstration and practice of routine and special radiographic positions of the skull, facial bones, and paranasal sinuses.

Prerequisites: RDSC 211 and RDSC 233 with grade "C" or better.

### **RDSC 320 Surgical, Trauma and Mobile Radiography**

(3-3-4)

Routine radiographic examinations of the reproductive, muscular, nervous, skeletal and circulatory systems. Also including emergency and surgical procedures, using various contrast media and filming techniques. The comprehensive study of all radiographically significant anatomy, physiology, pathology, terminology, and topography including all contrast studies of these systems. Control of microorganism by physical and chemical means is incorporated as necessary.

### **RDSC 326 Cardiovascular/Interventional Technology**

(3-3-4)

Demonstration and practice of special radiographic examinations of nervous and vascular systems including use of serial film changers and pressure injectors, and other necessary equipment. Also includes related nursing procedures.

Prerequisites: RDSC 211, RDSC 233, and RDSC 320 with grade "C" or better.

### **RDSC 350 Bones: The Interactive Anatomy and Position Course**

(2-0-2)

A sequential review of osteology and positioning designed for the medical imaging student who has completed the positioning sequence, or the graduate seeking continuing education credit.

Prerequisites: RDSC 210, RDSC 211, RDSC 301, or Registered Radiologic Technologist.

### **RDSC 354 Mammography**

(3-3-4)

An in-depth analysis of mammographic positioning, exposure techniques, quality control, film critiquing, and radiation safety. Includes mock registry exam.

Prerequisite: RDSC 301.

### **RDSC 355 Computed Tomography**

(3-3-4)

X-ray physics, scanner components, and data acquisition of computed tomography. Image

reconstruction, manipulation, and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis, and musculoskeletal system. Laboratory simulation is included.

Prerequisite: BIO 335.

### **RDSC 356 Magnetic Resonance**

(3-3-4)

Physics and principles used in the production of magnetic resonance images and spectroscopy. Static magnetic fields, gradient magnetic fields, secondary coil fields, nuclear magnetic resonance (NMR), spatial domain, frequency domain, computer data acquisition, relaxation times, pulse sequence diagrams. Laboratory simulation is included.

Prerequisites: BIO 335 and PHY 201 or PHY 217 all with grade "C" or better.

### **RDSC 365 Advanced Quality Assurance/Quality Control**

(3-3-4)

Principles of diagnostic radiographic quality assurance systems including: quality control testing, equipment calibration, preventive maintenance, and government regulations. Laboratory experiments involve QC tests and measurements.

Prerequisites: RDSC 202, RDSC 272.

### **RDSC 366 Radiographic Pathology**

(3-0-3)

An overview of common pathological conditions encountered in the clinical setting, for RDSC students. Pathology is categorized by body systems. The students will learn the pathology as they relate to: signs and symptoms, etiology, imaging diagnosis and prognosis and treatment.

### **RDSC 388 Externship Preparation**

(2-0-2)

Presentation of key concepts related to Radiologic Science externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the RDSC Externship Handbook. This course is a mandatory course that must be completed prior to externship.

Prerequisite: RDSC 356.

### **RDSC 410 Radiologic Science Externship**

(0-40-15)

Students must complete four terms (12 months) of clinical experience in both general

radiography and special imaging modalities, to include computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and/or cardiovascular interventional technology at an affiliated clinical site. Students will complete all phases of general radiography and a maximum of 12 weeks in the special imaging modalities. Students under the direct supervision of qualified radiographers and radiologists.

Prerequisites: All academic coursework in the Radiologic Science curriculum.

### **RDSC 411 Special Radiologic Science Externship**

(0-40-15)

This one-term (three-month) practicum is designed to develop the skills of the student in the special imaging modalities, i.e., computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and special radiographic procedures. The student is sent to an affiliated hospital that has the required special imaging equipment to give the hands-on experience to develop competency in each of three areas chosen by the student. The student will spend one month in each selected area.

Prerequisites: The student must have completed all academic coursework in the Medical Imaging program with grade "C" or better and be a Registered Technologist.

### **RDSC 411A, RDSC 411B Special Radiologic Science Externship**

(411 A, 0-18-7)(411B, 0-22-8)

This two-term practicum is designed to develop skills of the degree completion student in special imaging modalities of computed tomography, magnetic resonance imaging, cardiovascular/interventional technology, mammography, quality assurance, nuclear medicine technology, or sonography. The student selects a local hospital or medical center that has the necessary equipment. Upon approval of the facility, the student begins a supervised experience to develop competencies in each of three chosen areas.

Prerequisites: Be an ARRT registered technologist in good standing, and have completed all the academic coursework in the Medical Imaging curriculum with grade "C" or better.

### **RDSC 471 Clinical Imaging Education I**

(1-0-1)

Development and application of clinical education objectives relating to medical imaging

technology. Instruments used to evaluate student clinical performance and competence.

Prerequisite: RT(R) (ARRT).

## **(REE) Renewable Energy Engineering**

### **REE 107, REE 207, REE 307, REE 407 Seminar**

(Hours to be arranged each term.)

### **REE 201 Introduction to Renewable Energy**

(3-0-3)

An introduction to renewable energy. Topics include photovoltaics, solar thermal systems, green building, fuel-cells, hydrogen, wind power, waste heat, biofuels, wave power, tidal power and hydroelectric. Discussions of economic, environment, politics and social policy are integral components of the course.

Prerequisite: MATH 111.

### **REE 243 Electrical Power**

(3-3-4)

Fundamentals of electrical power; three-phase power systems, power factor, harmonics, resonance, PF correction. Electrical power systems: power transformers; transmission lines, distribution and transmission, HVAC and HVDC. Power systems representation: single-line diagrams, per-unit representation. Symmetric and asymmetric faults. Power flow analysis.

Prerequisites: EE 223; MATH 252.

### **REE 253 Electromechanical Energy Conversions**

(2-3-3)

AC machines, including single phase, split-phase and three-phase (induction and synchronous machines) motors and generators; introduction to power switching devices, speed control and brushless DC motors. DC machines including shunt, series and compound. Control devices and circuits, including ladder diagrams.

Prerequisite: EE 223; MATH 252.

### **REE 331 Fuel Cells**

(2-3-3)

Introduction to fuel cell technologies: PEM, PAFC, AFC, SOFC, MCFC and DMFC systems. Fuel cell components and systems; field flow plates, electrolytes, electrode materials, electrode catalysts, on-board reformers. Portable devices, utility-scale power produc-

tion, transportation systems. Fuel types and fuel storage.

Prerequisites: CHE 260 and PHY 222.

### **REE 333 Batteries**

(2-3-3)

This course covers fundamentals of the most important battery types including alkaline, zinc-air, lead-acid, nickel-cadmium, nickel-metal hydride, lithium ion and lithium polymer. Applications include stationary, transportation and portable batteries. The lab deals with battery system design, testing and prototype assembly.

Prerequisite: CHE 260.

### **REE 335 Hydrogen**

(2-3-3)

This course will cover hydrogen production, storage, distribution and use. Specific energy scenarios such as renewable hydrogen cycles will be explored focusing on transportation applications. The concept of hydrogen economy will be discussed in the context of global energy crisis. Prerequisite: CHE 260.

### **REE 337 Materials for RE Applications**

(3-0-3)

Electrical, mechanical, thermal, chemical, optical, and processing properties of materials in renewable energy systems; solid-state device characteristics and their material properties. Engineering applications.

Prerequisites: CHEM 202 and CHEM 205 or CHE 222; PHY 223.

### **REE 339 Senior Project I**

(1-3-2)

Selection, definition, and analysis of a problem suitable for a renewable energy engineering senior project prior to actual project development. Includes consideration of project parameters, and implications, proposal of alternate solutions, and justification of selected solution. Culminates in the writing of project proposal.

Prerequisite: WRI 327.

### **REE 344 Nuclear Energy**

(3-0-3)

Introduction to nuclear energy. Atomic and nuclear physics; the interaction of radiation and matter. Nuclear reactor operation; reactor components, nuclear cycles, neutron diffusion and moderation. Reactor shielding. Fuel reprocessing and waste disposal. Reactor licensing and safety. Economics and environmental concerns.

Prerequisites: CHE 202 and CHE 205 or CHE 222; PHY 223.

### **REE 345 Wind Power**

(3-0-3)

Introduction to power production from wind resources. Historical uses of wind resources. The Earth's wind systems. Physics of wind power. Vertical and horizontal axis turbines. Aerodynamics of wind turbines. Large-scale turbine farms and sighting. Commercial development, economics and environmental impacts.

Prerequisites: REE 253 or MECH 326. PHY 222.

### **REE 346 Biofuels and Biomass**

(2-3-3)

Introduction to power production from biomass resources. Historical uses of biomass resources. Biomass as a solar energy store; forestry and agricultural sources, crop wastes. Recycled sources; municipal solid wastes, landfill gas. Gaseous fuels; anaerobic digestion, gasification, liquid fuels, fermentation, hydrolysis, transesterification.

Prerequisites: CHE 202, or CHE 222, PHY 222.

### **REE 347 Hydroelectric Power**

(3-0-3)

Introduction to hydro-resource power production. Hydro-power in history. Physics of hydrology. Power, head, flow-rate. Turbine hydrodynamics; Francis, Kaplan, Pelton, Turgo, cross-flow. System components: generators, governors, penstocks, spillways, valves, gates, trashracks. Large-scale and microhydroelectric systems. Pumped storage. Economic, environmental considerations.

Prerequisites: MECH 318; MECH 326 or REE 253.

### **REE 348 Solar Thermal Energy Systems**

(3-0-3)

Introduction to solar thermal energy systems for residential, commercial and industrial applications. Solar radiation; topics in heat transfer; flat plate and concentrating collectors; non-imaging optics; applications including water heating, building heating, cooling, industrial process heat, distillation, solar thermal power systems.

Prerequisites: MECH 323, ENGR 355.

### **REE 412 Photovoltaic Systems**

(3-0-3)

The solar resource, sun charts, site assessments. Grid-connected and stand-alone systems. Module and array performance. PV system components including batteries, modules, charge controllers, maximum power point trackers, inverters. Economic considerations including investment tax credits, present-value analysis, IRR. Advanced PV materials.

Prerequisite: EE 343 or REE 337.

### **REE 413 Electric Power Conversions Systems**

(2-3-3)

Power electronics applications in renewable energy systems. Grid-tied inverters, variable frequency drives, static compensators, charge controllers, maximum power point trackers. Power flow control. Harmonic compensation. Grid synchronization and protection: HVDC and FACTS devices and applications.

Prerequisites: EE 419

### **REE 427 Greenhouse Gas Accounting/Footprints**

(3-0-3)

Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as ENV 427 (cannot be used for graduation credit by students who have taken ENV 427).

Prerequisites: Junior or senior standing, MATH 361 or MATH 465; WRI 227.

### **REE 439 Building Energy Auditing and Management**

(3-0-3)

Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

Prerequisite: MECH 433.

### **REE 449 Senior Project II**

(0-6-2)

A continuation of REE 339. Prototype construction of project solution begins. Writ-

ten documentation is produced including design calculations and functional analysis of hardware and/or software needed for project solution.

Prerequisites: REE 339.

### **REE 451 Geothermal Energy and Ground-Source Heat Pumps**

(3-0-3)

An introduction to geothermal energy resources. Discussion of heat flow mechanisms. Investigation into heat exchange systems including: binary, flash, double flash, total flow. Application of thermal dynamics in analysis, design and control of heating/cooling systems.

Prerequisite: MECH 323.

### **REE 453 Power System Analysis**

(3-0-3)

Faults: symmetric, unsymmetric. Modeling system components using positive, negative, zero sequence networks. System admittance matrixes. Load flow computational methods such as Gauss-Seidel, Newton-Raphson.

Power system transients. Voltage, frequency stability. Power system stabilization. Power system analysis using software, emphasizing renewable resources.

Prerequisites: ENGR 267, REE 243.

### **REE 454 Power System Protection and Control**

(3-0-3)

Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power system protection and control using power system analysis software, emphasizing renewable resources.

Prerequisite: REE 453.

### **REE 455 Energy-Efficient Building Design**

(3-0-3)

Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

Prerequisite: MECH 433.

**REE 459 Senior Project III**

(0-6-2)

Completion of the project proposed in REE 339 and designed in REE 449. Documentation with specifications, functional description, calculations, test results, schematics, graphs, flowcharts, parts lists, diagrams and photographs become part of the project final report. The student defends their project before a review panel.

Prerequisite: REE 449.

**REE 463 Energy Systems Instrumentation**

(2-3-3)

Application of electrical and mechanical sensors, data acquisition and logic controllers as applied to energy systems. Determination of physical parameters necessary for control and data-logging. Methods of calibration and correction.

Prerequisite: EE 321.

**REE 465 Renewable Energy Transportation Systems**

(3-0-3)

Renewable energy transportation systems including fuel cells, hybrid gasoline-electric engines, electric vehicles, bio-diesel, flex-fuel vehicles, high-efficiency diesel engines, gas turbine prime-mover systems. Topics include fuel-air mixing, fuel storage, fuel delivery, cooling, fuel leak detection, chemical safety, and electrical power control systems.

Prerequisites: REE 253 or MECH 326. MECH 323.

**REE 469 Grid Integration of Renewables**

(3-0-3)

Issues unique to connecting renewable energy generation to the grid, Microgrids, Stability, transient and harmonic effects. Interconnect agreements and requirements, Standards development. SCADA and smart grid concepts, System optimization.

Prerequisite: REE 454.

**REE 511 Research Methods & Innovation I**

(3-0-3)

Fundamental concepts of scientific research. An introduction to the concepts underlying peer-reviewed research, evaluating the relevance and impact of sources, conducting literature reviews, evaluating published findings, using research productivity tools, using statistical methods, designing research studies, and writing scholarly articles.

**REE 512 Research Methods & Innovation II**

(3-0-3)

Intellectual property (IP) development, evaluation, and strategy. IP fundamentals, patent fundamentals, conducting patentability searches, evaluating the patentability potential of an invention, drafting invention disclosures for patent applications, assessing the value of a patent or patent portfolio, and IP licensing fundamentals.

**REE 513 Research Methods & Innovation III**

(3-0-3)

Strategy and innovation concepts with a focus on technology commercialization. Business strategy frameworks, financial analysis, strategic marketing, operations management, business models, project management, business law, and entrepreneurship.

**REE 515, REE 516, REE 517 Energy Engineering I, II, III**

(3-0-3) (3-0-3) (3-0-3)

Three-term sequence in energy engineering. For a variety of renewable and conventional means of energy production, storage, and distribution, students gain a robust understanding of resources, energy conversion technology, integration with existing systems, regulatory contexts, business environment, and future trends.

**REE 521 Production of Biomass & Biofuels (3-0-3)**

The use of recently living plant or animal materials as sources of fuels, chemicals or industrial products. Sourcing and production. Biomass chemistry; lignocellulosics, fats, oils, saccharides, polysaccharides, proteins, and extractables. Chemical modification of biomass to produce fuels, polymers, industrial chemicals.

**REE 523 Hydrogen Production and Storage**

(3-0-3)

An overview of primary technologies, economic aspects, and social policy issues related to development of hydrogen systems and hydrogen economy, including water electrolysis, reformer technologies, and hydrogen storage.

**REE 525 Solid-State Physics of Photovoltaic Materials**

(3-0-3)

Principles of PV; electrons and holes in

semiconductors; junction analysis. Survey of available semiconductors and materials choices for photovoltaic design. Principles of important photovoltaic devices. Monocrystalline, polycrystalline, and thin film solar cells. Strategies for high efficiency. Photovoltaic materials and phenomena.

**REE 527 Wind Power Generators**

(3-0-3)

Wind energy as a power source. AC machines, particularly three-phase induction and synchronous generators for wind power generation. Equivalent circuit models. Wound-rotor, permanent magnet, multi-pole, and switched-reluctance generators. Power and torque control.

**REE 529 Power System Analysis**

(3-0-3)

Faults: symmetric, unsymmetric. Modeling system components using positive, negative, zero sequence networks. System admittance matrixes. Load flow computational methods such as Gauss-Seidel, Newton-Raphson. Power system stabilization. Power system analysis using software, emphasizing renewable resources. Requires background in power systems.

**REE 531 Ground-Source Heat Pumps**

(3-0-3)

Heat pump design and operation. Heat pump cycles. Refrigerant selection. Ground-loop design. Heat transfer issues pertaining to geothermal energy. System design and integration. Temperature and materials issues unique to geothermal heat pumps.

**REE 533 Heating, Ventilation and Air Conditioning**

(3-0-3)

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

**REE 535 Fuel Cell Fundamentals**

(3-0-3)

Basic science and technology of fuel cells, electrode processes, electrolyte types, catalysts, and balance of plant components.

**REE 537 Sustainability of Energy Systems**

(3-0-3)

Comprehensive examination and classification of the local, regional, and global environmental and social aspects of energy use including lifecycle assessments. Impacts of global and national politics on energy use decisions.

**REE 539 Hydraulics & Fluid Mech. of Hydropower**

(3-0-3)

Open-channel hydraulics, including watershed hydrology, sediment transport and bed load movement, reservoirs, hydrostatics, dredging, spillways, stilling basins, and hydraulic jumps. Advanced fluid mechanics. Types of turbines. Modeling and unit optimization. Background in fluid mechanics required.

**REE 541 Utilization Strategies of Bioenergy**

(3-0-3)

Strategies for sustainable energy production from biomass. Direct combustion. Fermentation processes. Anaerobic digestion systems. Thermochemical processes; gasification, liquefaction. Chemical synthesis pathways.

**REE 543 Materials for Electrochemical Processes**

(3-0-3)

Materials used for batteries, fuel cells, electrolyzers, and supercapacitors; their classification, selection and properties, including nanocatalysts, polymer electrolytes, ceramic and plastic packaging materials, and metals.

**REE 545 Applied Photovoltaics**

(3-0-3)

The characteristics of sunlight. Solar cell behavior, properties, and design. Cell interconnection and module fabrication. Designing stand-alone and grid-connected photovoltaic systems. Special-purpose photovoltaic applications. Concentrator and hybrid solar thermal and photovoltaic systems. Advanced photovoltaic systems.

**REE 547 Electric Power Conversion**

(3-0-3)

Electric power conversion for wind generators. Review of power switching devices. Rectifiers, DC-DC converters, inverters. Pulse-width modulation. Converter topologies. Doubly-fed induction generators. Reactive power compensation.

**REE 549 Power System Protection & Control**

(3-0-3)

Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power systems protection and control using power system analysis software, emphasizing renewable resources. Prerequisite: REE 529

**REE 551 Advanced Geothermal Energy**

(3-0-3)

Classification of geothermal resources. Basics of geothermal wells and drilling. Resource capacity estimation and measurement. System design and integration. Applications such as aquaculture, greenhouses, and district heating.

**REE 553 Energy Systems Management and Auditing**

(3-0-3)

Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

**REE 555 Stationary Fuel Cells**

(3-0-3)

Advanced treatise of fuel cell systems for large, stationary applications with detailed examination of polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, and solid-oxide systems, their design, performance, lifetime and reliability, modeling, and economics.

**REE 557 Costing Renewable Energy**

(3-0-3)

Renewable energy in micro- and macroeconomic contexts. Review and discussion of current energy market structures, prices, effects of inflation and incentives, affordability, costs of supply reliability, investment criteria, and modeling market trends.

**REE 559 Development of Hydropower Projects**

(3-0-3)

Mechanical and electrical equipment, including flow control elements, generators,

transformers, protection and control equipment, and governors. Transient responses and stability. The engineering, procurement and construction process for hydropower projects. Commissioning and documentation.

**REE 561 Process Design and Economic Evaluation for Biomass Energy Systems**

(3-0-3)

Process engineering methods, including development of process and instrumentation diagrams (P&ID); equipment selection and sizing; cost estimation, economic evaluation; and, fundamentals of chemical process safety.

**REE 563 Batteries**

(3-0-3)

Comprehensive overview, integration characteristics, and performance comparison of battery systems for transportation and stationary applications, including lead-acid, nickel metal hydride, nickel cadmium, sodium-sulfur, lithium polymer, and lithium ion.

**REE 565 Semiconductor Process Engineering**

(3-0-3)

Semiconductor process technology: crystal growth, silicon oxidation, photolithography, etching, diffusion, ion implantation, film deposition. Process integration, manufacturing, and metrology. Future trends and challenges.

**REE 567 Wind Energy Systems Integration**

(3-0-3)

Wind system electric power integration, protection, and control. System components, including generators, transformers, and switching stations. Network stability. Energy sector regulation and markets. Forecasting and integration of wind power systems.

**REE 569 Grid Integration of Renewables**

(3-0-3)

Issues unique to connecting renewable energy generation to the grid. Microgrids. Stability, transient, and harmonic effects. Interconnect agreements and requirements. SCADA and smart grid concepts. System optimization. Prerequisite: REE 549

**REE 571 Geothermal Power Generation**

(3-0-3)

High-enthalpy resources suitable for electric power generation. Energy transfer and

conversion. Plant design and integration. Advanced design such as absorption power cycles.

### **REE 573 Energy-Efficient Building Design**

(3-0-3)

Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

### **REE 575 Transportation Fuel Cells**

(3-0-3)

Detailed assessment of advances, prospects, and economics of polymer electrolyte membrane fuel cell, operational characteristics, durability, manufacturing, and fuel storage options in the automotive applications.

### **REE 577 Renewable Energy Integration**

(3-0-3)

Discussion based-class on the integration of renewable energy into the established electric grid, focusing on energy availability, reliability, options for integration, matching demand, and balancing economic options on global, regional, and local scales.

### **REE 579 Economic, Regulatory, and Environmental Aspects of Hydropower**

(3-0-3)

Duration curves and generation studies. FERC permitting and licensing, including compliance. Power sales contracts and bundled services. Environmental impact assessments. Project financing, management, and operations requirements. Optimization of integrated hydropower systems.

## **(SOC) Sociology**

### **SOC 107, SOC 207, SOC 307, SOC 407 Seminar**

(Hours to be arranged each term.) SS

### **SOC 204 Introduction to Sociology**

(3-0-3) SS

Survey of human relationships and interaction of organized groups and institutions

in modern society. Emphasis on attitudes, values, beliefs, customs and change within our complex social structure.

### **SOC 210 Marriage and Family Living**

(3-0-3) SS

Personal problems of the married couple in everyday living with an emphasis on adult lifestyles, relationships, sexual roles and attitudes, family planning, family finances, and divorce and remarriage.

### **SOC 225 Medical Sociology**

(3-0-3) SS

Introduction to medical sociology and social-epidemiological research, covering social causes and consequences of health and illness, the practitioner-patient relationship, health behavior, and health care organization.

### **SOC 235 Introduction to Sustainability**

(3-0-3) SS

An introduction to the history, theory and practice of sustainability. The focus is on human-environment interactions, highlighting how human agency can jeopardize our collective future, and how harm can be avoided through appropriate social, political, and legal action.

### **SOC 304 Criminology**

(3-0-3) SS

Analysis of criminal behavior from theft to homicide. Discussion of the definition of criminal behavior, varieties of crime and the criminal justice system.

Prerequisite: SOC 204.

### **SOC 305 Rural Health**

(3-0-3) SS

Advanced introduction to rural population health and health care. Topics include rural population health and health behavior, economic and social/structural issues, and health care delivery and reform.

Prerequisite: SOC 225.

### **SOC 325 Global Population Health**

(3-0-3) SS

Introduces demographic methods and theories of population health, in addition to trends in fertility, mortality, morbidity, and aging both in the U.S. and internationally.

Prerequisite: SOC 204, or SOC 225, or MATH 111.

### **SOC 335 Health Inequality and Cultural Competency**

(3-0-3) SS

Introduction to health inequality based on systematic social research. Provision of basic training on cultural competency and under-represented populations' engagement with the health care system.

Prerequisite: SOC 225

## **(SPAN) Spanish**

### **SPAN 101, 102, 103 First Year Spanish**

**Spanish**

(4-0-4)

An introduction to elementary Spanish. A three-term sequence for beginners. Emphasis on vocabulary building, listening comprehension, phonetics, oral practice, and elements of grammar. Elementary readings and writings will be required.

Prerequisite: Taken in sequence or instructor consent.

### **SPAN 107, SPAN 207, SPAN 307, SPAN 407 Seminar**

(Hours to be arranged each term.)

### **SPAN 201, 202, 203 Second Year Spanish**

(4-0-4) H

Intensive introduction to the language. Course aims at progressive development of fluency through extensive exposure to the language in real situations. Comprehension-based approach.

Prerequisite: SPAN 103 or instructor consent. SPAN 201, SPAN 202, SPAN 203 taken in sequence or instructor consent.

## **(SPE) Speech**

### **SPE 107, SPE 207, SPE 307, SPE 407 Seminar**

(Hours to be arranged each term.)

### **SPE 111 Public Speaking**

(2-2-3) C

Public speaking with emphasis on content, organization, and speaker adjustments to various situations; dynamics of the speaker/listener interaction; and appropriate language usage. Includes informative, demonstrative, and persuasive speeches.



**SPE 314 Argumentation**

(2-2-3)

Examines argumentation as part of human interaction and inquiry. Explores arguing to gain adherence as a way of reasoning. Practice in public speaking, debate, ethics and critical thinking.

Prerequisite: SPE 111.

**SPE 321 Small Group and Team Communication**

(2-2-3) C

Provides instruction and experience in decision making through group processes designed to develop competent team leaders and participants. Participation in and evaluation of a variety of group communication exercises.

Prerequisite: SPE 111.

**(STAT) Statistics****STAT 412 Regression and Time Series**

(4-0-4)

Examines an introduction to regression analysis with a focus on multiple linear regression. Topics include statistical inference, goodness of fit, diagnostics, criteria for choosing covariates, categorical predictors, and an introduction to analysis of time series data.

Prerequisite: Math 362

**STAT 413 Categorical Data Analysis**

(4-0-4)

Introduces analysis techniques for categorical data. Measures of stochastic superiority, odds ratios, techniques for Likert data, Models for frequency arrays, goodness-of-fit tests, two-, three-, and higher- way tables, latent and logistic models will be presented.

Prerequisite: MATH 362

**STAT 414 Statistical Methods in Epidemiology**

(4-0-4)

Examines the methods used in epidemiologic research, including the design of epidemiologic studies and the collection and analysis of epidemiological data.

Prerequisite: Math 361

**Stat 415 Design and Analysis of Experiments**

(4-0-4)

Examines the principles of experimental design; construction and analysis of completely

randomized design, randomized block design and Latin square designs; covariates; factorial treatments, split plotting; random effects and variance components

Prerequisite: MATH 362

**STAT 431 Sampling Methods**

(4-0-4)

Construction of sampling frames; estimation of means, total and proportions: sampling designs including simple random, stratified, cluster, systematic, multistage and double sampling; ratio and regression estimators; source of errors in surveys; capture and recapture methods;

Prerequisites: MATH 361, 362

**(VAS) Vascular Technology****VAS 107, VAS 207, VAS 307, VAS 407 Seminar**

(Hours to be arranged each term.)

**VAS 214 Vascular Anatomy**

(3-3-4)

Detailed consideration of the gross and microscopic anatomy of arteries and veins throughout the human body. Laboratory includes cadaver dissection, anatomical models, and an introduction to instrumentation and basic ultrasound scanning techniques.

Prerequisite: MIT 103 with grade "C" or better.

**VAS 225 Patient Management Practices**

(2-3-3)

Current issues in the practice of vascular technology with emphasis on basic concepts of patient care, infection control procedures, and the technologist's responsibility to the patient, the patient's family, and the vascular technology profession.

Prerequisite: VAS 246 with grade "C" or better.

**VAS 245 Peripheral Venous Disease**

(3-3-4)

Investigation to the pathophysiology of venous disease with emphasis on theoretical and practical considerations of diagnostic methods of venous testing. These include clinical assessment, plethysmography, and duplex imaging of lower extremity veins.

Prerequisite: VAS 246.

**VAS 246 Peripheral Arterial Disease**

(3-3-4)

Investigation of the pathophysiology of arterial occlusive disease with emphasis on the theoretical and practical considerations of diagnostic methods of arterial testing. These include clinical assessment, physiological evaluation and duplex imaging of lower extremity arteries.

Prerequisite: VAS 214.

**VAS 335 Radiographic Vascular Anatomy**

(3-0-3)

Survey of medical imaging modalities ancillary to vascular sonography including angiography, digital subtraction angiography, computerized tomography and magnetic resonance angiography. Student teams will prepare case studies comparing the efficacy of these imaging modalities.

Prerequisite: VAS 214 with grade "C" or better.

**VAS 337 Survey of Echocardiography**

(3-0-3)

A survey of basic echocardiography with emphasis on normal cardiac anatomy and abnormal disease states. Standard sonographic imaging techniques of adult echocardiography, including instrumentation and protocols.

Prerequisites: BIO 220, VAS 246.

**VAS 365 Abdominal Vascular Disease**

(3-3-4)

Diagnostic methods of abdominal and visceral vascular disease testing. Includes aorto-iliac, renal artery and kidney, mesenteric system, liver system, and transplantations. Laboratory emphasizes advanced instrumentation and scanning techniques, patient interviews, clinical signs and symptoms, physical assessment and findings.

Prerequisite: VAS 246.

**VAS 366 Special Circulatory Problems**

(3-3-4)

Diagnostic methods of testing the efficacy of vascular surgical procedures and interventions. To include arterial bypass grafts, organ transplants and dialysis access grafts. Venous and arterial mapping, upper extremity venous and arterial disease testing, IVUS, pseudoaneurysm treatment and compartment syndrome will also be covered.

Prerequisite: VAS 365.

**VAS 367 Cerebrovascular Disease**  
(3-3-4)

Theoretical and practical considerations of diagnostic methods of testing arterial and venous diseases affecting the vasculature of the head and neck including the intracerebral vessels. Laboratory includes advanced instrumentation and scanning techniques, and instruction on patient interviewing, clinical signs and symptoms, physical assessment and findings.

Prerequisites: VAS 366, VAS 375.

**VAS 375 Survey of Abdominal Sonography**  
(3-0-3)

A survey of basic abdominal sonography with emphasis on normal abdominal anatomy and abnormal disease states. Standard sonographic imaging techniques of general abdomen, instrumentation, and abdominal protocols.

Prerequisite: VAS 365.

**VAS 385 Vascular Laboratory Management**  
(3-0-3)

Focus on human resource skills as necessary to manage a vascular laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

Corequisite: VAS 388.

**VAS 388 Externship Preparation**  
(3-0-3)

Review and summarization of key concepts in Vascular Technology. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent vascular lab. Review and discussion of the Vascular Technology Externship Handbook.

Prerequisites: VAS 366, VAS 375 with grade "C" or better.

Corequisites: VAS 367, VAS 385.

**VAS 420 Vascular Technology Externship**  
(0-40-15)

All B.S. students complete four terms (12 months) of clinical experience in Vascular Technology at an affiliated clinical site. Students work under the direct supervision of Registered Vascular Technologists and provide monthly log sheets and evaluation forms. Students prepare clinical case studies each term.

Prerequisites: All academic coursework in the Vascular Technology curriculum.

**VAS 420A, 420B Special Vascular Technology Externship**  
(420A, 0-22-8)(420B, 0-18-7)

This two-term special externship is designed for the degree completion student. Students working in a clinical vascular setting will prepare clinical case studies as well as rotate through special imaging modalities.

Prerequisites: Be an ARDMS or CCI Registered Vascular Technologist in good standing, and have completed academic coursework in the Medical Imaging curriculum with grade "C" or better.

**(WRI) Writing****WRI 107, WRI 207, WRI 307, WRI 407 Seminar**

(Hours to be arranged each term.)

**WRI 115 Introduction to Writing**  
(3-0-3)

Focuses on sentence structure, paragraph coherence, and essays. Regular writing and feedback develop student competency in college level writing. May not be used to meet general education requirement or graduation credit.

Prerequisites: Writing ability as demonstrated by SAT/ACT score and/or writing sample.

**WRI 121 English Composition**  
(3-0-3) C

Introduces critical reasoning and analysis. Explores connections between thesis, structure, tone and purpose; includes writing process, rhetorical strategies applications. Focuses on academic reading, writing and research skills.

Prerequisite: Writing ability as demonstrated by SAT/ACT score and/or writing sample.

**WRI 122 Argumentative Writing**  
(3-0-3) C

Designed to develop skills in ethical argument, research, critical thinking. Multipage papers, including argumentative research paper, required. Focuses on writing process with attention to audience, effective style, overall rhetorical effect.

Prerequisite: WRI 121 with grade "C" or better.

**WRI 123 Research Writing**  
(3-0-3) C

Focuses on the formal research paper, including research techniques and process of

developing a longer document.

Prerequisite: WRI 122.

Pre- or corequisite: SPE 111.

**WRI 214 Business Correspondence**  
(3-0-3) C

Focuses on theories and strategies governing written correspondence. Designed to equip the student to perform effectively in a variety of business writing situations; major emphasis on practical applications.

Prerequisites: WRI 122 or equivalent.

**WRI 227 Technical Report Writing**  
(F,W,S)(3-0-3) C

Focuses on techniques of gathering, organizing, and presenting technical information and graphics. Requires technical reports derived from realistic situations in the student's major.

Prerequisite: WRI 122.

Pre- or corequisite: SPE 111.

**WRI 305 Writing for the Marketplace**

(As required)(3-0-3)

Designed to introduce the basics of professional writing – fiction, personal experience, and technical articles, etc. for publication, including marketing and manuscript preparation. Each student must submit at least one article or story (8 pages or more) for publication during the term.

**WRI 327 Advanced Technical Writing**

(F,W,S)(3-0-3) C

Processes involved in technical writing and methods of preparing technical data; offers a variety of writing problems to provide opportunities for the student to develop precision in statement and in graphic presentation.

Prerequisite: WRI 227.

**WRI 328 Technical Journalism**  
(2-3-3) C

Production of a weekly newspaper (The Edge). Includes journalistic writing, design, layout, and production, as well as proposals, memos, business correspondence, and recommendation reports. May substitute for WRI 327 with approval of student's major department.

Prerequisites: WRI 227 and consent of instructor and advisor.

**WRI 350 Documentation Development**

(3-0-3) C

Provides students with basic tools for preparing documentation. Focuses on usability of documentation and includes planning and scheduling, audience evaluation, use of appropriate examples and illustrations, style, editing technique, organization and research. Prerequisite: WRI 227.

**WRI 410 Proposal and Grant Writing**

(3-0-3) C

Provides theory and skills in proposal writing for seeking funding from public and private agencies and for preparing proposals in business and industrial settings. Focuses on the process of preparing proposals, including analyzing audiences, conducting research, organizing, writing, and editing. Prerequisite: WRI 227.

**WRI 415 Technical Editing**

(3-0-3)

Focuses on the role of the technical editor in business and industry. Examines the publishing process, the dynamics of the editor/writer relationship, and mechanics and techniques of proofreading and copyediting. Provides considerable practice in copyediting and proofreading manuscripts. Prerequisite: WRI 227 or appropriate work experience.

**WRI 420 Document Design**

(3-0-3)

Applies publishing and graphic arts principles to the preparation of professional publications and presentation materials. Includes typography, design principles, the use of graphical elements, and integration of text and graphics. Prerequisites: SPE 111, WRI 227.

# Administrative Offices

## Academic Agreements

Center for Health Professions DOW, E213  
(541) 885-1844

Oregon Tech's Office of Academic Agreements cultivates and maintains partnerships with area high schools, community colleges, and universities that result in increased access and smooth transitions for students. The office forges meaningful relationships with educational partners by connecting facul-

ties, coordinating partnerships, participating in pathways and other local and statewide advisory boards and providing internal and external communication and promotion of partnerships. The office develops dual enrollment agreements with college and university partners, coordinates dual credit and other programs with high schools locally and statewide, manages and coordinates articulation

agreements, and develops and manages other academic agreements.

Information about the work of the Academic Agreements Office, Dual Enrollment with colleges and universities, dual credit with high schools and specific articulation agreements can be found on the web page or by contacting the office.

## Affirmative Action and Equal Opportunity

Snell Hall, 108  
(541) 885-1108

The Affirmative Action Officer is charged with oversight and enforcement of Oregon Tech's compliance with relevant federal, state and university civil rights statutes and regulations. Complaints and grievances related to unlawful discrimination and harassment

under Title IX, the Civil Rights Act, the Rehabilitation Act, the Americans With Disabilities Act and employment law are to be directed to the Officer for resolution. The Officer also coordinates Oregon Tech's Equal Opportunity programs and activities which seek to maintain a learning and working environment that fosters diversity, inclusion and personal success.

Inquiries, requests for assistance, or grievances pertaining to Oregon Tech policies on discrimination, harassment, equal opportunity or access to programs and services should be directed to this office, located in the Human Resources Office in Snell Hall.

## Assessment

Purvine 185  
(541) 885-1915

Oregon Tech actively engages in assessment of both degree programs and broad institutional student learning outcomes (ISLOs). The director of Assessment, in conjunction with the Executive Committee of the Assessment Commission, leads the campus in these efforts.

Assessment plans are developed for each undergraduate and graduate degree program focusing on program learning outcomes created by each academic department. The faculty for the program identify strengths and weaknesses in student learning and recommend plans for improvement through a continuous program improvement process. Information on assessment of student learning outcomes is posted on the Oregon Tech

website at [www.oit.edu/provost/learningoutcomes](http://www.oit.edu/provost/learningoutcomes).

Oregon Tech faculty members also assess the ISLOs, which are intended to reflect common themes from departmental and program learning outcome statements. Information on assessment of ISLOs is posted on the Oregon Tech website at: [www.oit.edu/provost/islo](http://www.oit.edu/provost/islo).

## College Union

Information Desk, CU 116  
(541) 885-1030

The College Union is the center of student activity on campus and the Oregon Tech Veterans Lounge. Located within the Union are the student government offices, Campus Arts and Entertainment, the Diversity Cen-

ter, Student Services staff, Campus Dining operations, The Edge student newspaper, the Tech Nest bookstore, the Outdoor Program, the Women's Resource Center, and the main campus auditorium. In addition, there are comfortable study and lounge areas and meeting rooms for both student and community use. Coffee house functions, lectures,

special classes, shows, dances, and movies are among the typical events scheduled in this facility.

For information about using space in the College Union or to make a reservation, contact the CU Information Desk located on the lower level, south of the main entrance.

# Marketing and Communication

Snell Hall  
(541) 885-1162

The Marketing and Communication Department at Oregon Tech is responsible for developing and implementing integrated marketing and communication strategies designed to advance the university's image and standing among a variety of constituents and audiences.

The department is responsible for the university's brand position and identity. The Marketing and Communication Department works with academic programs and administrative departments throughout the university on marketing and advertising efforts, manages university-wide publications and the university's website, as well as social media. The department also serves as the public relations office for the university.

The Marketing and Communication Department is a creative team that provides writing, graphic design, photography, web content development, as well as strategic marketing and communication services to the university. The department promotes the university at the local, state, regional, and national levels through the media, as well as community and government relations.

# Student Affairs

College Union, 217  
(541) 885-1011

The Student Affairs Office is the office location for the Vice President for Student Affairs and the Dean of Students, and the Executive Assistant. The division of Student Affairs pro-

vides direct service to students in the following offices: Admissions, Campus Life, Financial Aid, Housing & Residence Life, the Integrated Student Health Center, and the Student Success Center, which is composed of Career Services, Disability Services, Testing Services, Tutoring Services, and TOP (a Trio program).

The Vice President for Student Affairs and her staff maintain close relationships with students and student organizations and are available for consultation and collaboration on all matters pertaining to student well-being and success.

# Strategic Partnerships and Government Relations

(503) 821-1247

The Office of Strategic Partnerships (OSP) and Government Relations promotes and oversees industry and government relationships at the Oregon Institute of Technology. The staff is responsible for campus-wide promotion of the University's economic development mission by facilitating the external relationships that enable the University to contribute to the vitality of its campus regions and the state of Oregon.

lative advisory councils with and for the Oregon University System and Oregon Tech.

The OSP collaborates with the Office of Innovation and Technology Transfer (OITT) to determine Oregon Tech's research priorities and align faculty research interests with industry, other universities, and economic development and research organizations. Operationally, the Office of Strategic Partnerships reports to the President and the Provost to advance the University's strategic priorities.

through internships and sponsored student projects, teach as adjunct faculty, recruit graduates for jobs, donate labs and equipment, and sponsor applied research. Oregon Tech could not fully execute its mission without the engagement and support of industry partners.

Oregon Tech is a member or partner with the Smart Grid Oregon, Drive Oregon, Oregon Solar Energy Industry Association, Renewable Northwest Project, Northwest Collaboratory for Sustainable Manufacturing, Oregon BEST (Built Environment & Sustainable Technology), Manufacturing 21 Coalition, Northwest High Performance Enterprise Consortium, Pacific Northwest Defense Coalition, Oregon Manufacturing Extension Partnership, Oregon Workforce Investment Board and several local workforce boards, Oregon Transportation Research and Education Consortium, Oregon Healthcare Workforce Institute, and the Greater Portland, Klamath Falls, North Clackamas, Tualatin, and Wilsonville Chambers of Commerce.

## The OSP has responsibility for:

1. Building long-term partnerships with businesses and industry associations that are crucial to Oregon Tech's mission;
2. Providing support to secure external funding by leveraging private sector partnerships for grants and sponsored projects;
3. Proactively working with faculty to develop collaborations with industry that lead to sponsored projects, commercialization and entrepreneurial opportunities;
4. Building an alliance of local, state and national support for Oregon Tech's policy and funding priorities; and
5. Representing the University on strategic partnerships, industry affairs, and legis-

## Business and Industry Partnerships

The Office of Strategic Partnerships assists OIT's faculty at all locations to connect to industry partners and advisors to ensure that OIT's courses integrate new technologies and are responsive to business needs for skilled professionals. Businesses throughout the Pacific Northwest, such as Intel, Pacific Power, Maxim, PCC Structural, Oregon Cutting Systems, Jeld-Wen, and the Boeing Company, send their best and brightest to Oregon Tech for professional development so they can advance into engineering, technology and management positions within their companies.

Oregon Tech's business partners participate on Industry Advisory Councils, support students

Individual businesses or business associations that are interested in university-industry partnerships are encouraged to contact the Associate Vice President for Strategic Partnerships or go to [www.oit.edu/partnerships](http://www.oit.edu/partnerships).

## Government Relations

Oregon Tech's government relations activities support the university community's vision "to be recognized as an outstanding university in Oregon, the Northwest region, and nationally with graduates who excel in the technological workplace. We will be known for our commitment to applied research, the preparation of 'world-ready' graduates, and partnerships that ensure quality programs and opportunities for Oregon Tech to be a leader in economic development."

Working with local, state and nationally elected and appointed leaders, Oregon Tech's government relations efforts are focused on

enhancing student and graduate success, continuing excellence in applied degree programs, providing statewide educational opportunities, and increasing service to the community.

Oregon Tech provides information to local, state and national legislator and policy makers on:

- Increasing access for rural and underserved students to science, technology, engineering and math (STEM) degree programs
- Workforce development support for local industries, such as healthcare, energy, and manufacturing

- Education policy and reform including Oregon Tech's initiatives to achieve the state's and nation's educational goals
- Financial aid and student access initiatives, with a focus on rural students and first-generation college students
- Reauthorization bills that impact Oregon Tech's portfolio of programs
- Federal competitive grants to enhance Oregon Tech's degree programs and net-zero campus initiatives

For updates and information, visit [www.oit.edu/partnerships](http://www.oit.edu/partnerships).

## Registrar's Office

Snell Hall, lower level  
(541) 885-1300

Major functions of the Registrar's Office are the maintenance of student records, registration, web services, grade processing, transfer-credit evaluation and community college articulation, degree checking, graduation, scheduling, veterans' services, enrollment certification and the catalog.

### Academic Information

The class schedule, introductory pages to the Class Schedule and General Catalog contain information about academic regulations, registration instructions and college procedures and policies. Students should be familiar with this information. These documents can be found on the Oregon Tech website at [www.oit.edu/registrar](http://www.oit.edu/registrar).

### Student Records

The Registrar's Office maintains information regarding academic progress, including grade reports and permanent academic records (transcripts). Students and alumni may request transcripts at any time.

The Registrar's Office also collects and maintains accurate information about students, such as address, curriculum (major) and advisor's name. Much of this information

is required for local and state enrollment reporting and for accurate mailing addresses. Changes to personal data such as address or name should be reported to the office promptly.

### Privacy Rights

Under the Family Educational Rights and Privacy Act of 1974, students are entitled to review records, files, documents and other materials that contain information maintained by the university. Students may challenge information considered inaccurate or misleading. A list of university records, the responsible custodians and the university policy on records are available in the Registrar's Office.

### Directory Information

The following information is considered Directory Information and may be made available to the public unless you restrict its release by written notice to the University Registrar by the last day to register or add courses for the current term.

Oregon Tech designates the following items as Directory Information: student name, current address, current telephone number, dates of attendance, classification (year in school), major field of study, most recent previous school attended, degrees and awards received

(including dates), hometown, past and present participation in officially recognized activities and sports; and for members of athletic teams: age, height and weight.

### Registration

The Registrar's Office publishes the class schedule and registration instructions for each term on the Oregon Tech website at [www.oit.edu/registrar](http://www.oit.edu/registrar). It also maintains class rosters for instructors and processes grades. Personal information, class schedules and grades, as well as unofficial transcripts, are on Oregon Tech's Web for Student and also available in the office.

# Athletics, Recreation and Fitness

Fitness Center  
(541) 885-1634

The mission of the Oregon Tech Athletic Department and the Tech Fit Center is to facilitate growth and development of students. The department provides a broad-based athletic program that creates educational opportunities through the medium of competition at the collegiate level as well as the opportunity to benefit personal health and fitness to the campus community through the Tech Fit facilities and educational classes. Oregon Tech's Athletics, Recreation and Fitness Education Center has many facilities, fitness and education opportunities. An expansion off the front of the center provides students with a larger cardiovascular workout area. A free-weight room stocked with all the needed equipment is located downstairs on the east side. There are tennis courts (four lighted), an eight-lane, 400-meter, all weather surface track and a lighted basketball court for your outdoor recreation. Also, watch for a lawn volleyball net as it tends to move around campus. Oregon Tech competitive athletics teams include men's and women's basketball, cross country, soccer and track; women's volleyball, women's softball and men's baseball. Beginning Fall 2013, Oregon Tech will begin fielding intercollegiate golf teams for men and women. Oregon Tech also supports men's and women's Rugby programs as extramural sports.

The Tech Fit Center, Athletics, Intramural Sports and Extramural Sports are funded by sales revenue (tickets, concessions, camps etc.), Incidental Fees, Oregon State Lottery funds, State General Appropriations and contributions from the community through the Oregon Tech Foundation.

The Tech Fit Center and athletics are financed by revenues generated from the programs' operation as well as from Incidental Fees, Oregon State Lottery funds, State General Appropriations and contributions from the community through the Oregon Tech Foundation or Oregon Tech Athletic Association.

## Competitive Athletic Teams

The Oregon Tech Athletic department is dedicated to preparing our student-athletes for professional and personal success in the real world by learning the values of integrity and excellence on the court, field and in the classroom. To that end, we are committed to field teams with the talent and ability to compete at the top of the Cascade Collegiate Conference, as well as regionally and nationally in the NAIA while representing Oregon Tech with dignity and class. To date, Oregon Tech has brought home four NAIA National Championships in team sports – men's basketball in 2004, 2008 and 2012 and

softball in 2011. The privilege of participation in intercollegiate athletics and dedication to team goals provides a classroom where students may experience the development of skills, sportsmanship, loyalty, self-discipline and responsibility while learning the values of winning, losing and competing. The Oregon Tech athletic program contributes to campus life by providing a focal point for social interaction, leadership development, involvement in peer support groups and entertainment.

## Intramural Sports

The Oregon Tech intramural program offers a variety of individual and team events in three divisions: men, women and co-ed. We hope that our program and its diversity will invite each of you to participate in at least one event during the academic year. Call 541-885-1722 for information about intramural sports programs or see the website for rosters and information.

## Tech Fit

The Tech Fit Center is free to all Oregon Tech students enrolled in eight or more credits per term. Students taking less than eight credits or community members may sign up in either credit or non-credit classes for a minimal charge. For more information call 541-885-1634.

# Campus Life

College Union, 108  
(541) 885-1827

The Department of Campus Life promotes the overall growth and development of Oregon Tech students through a Student Engagement model. We provide a broad range of opportunities for hands-on experiential

learning, self-discovery, leadership, diversity, community service, and social justice. Our goal is to empower students to be leaders in their community and a force for positive change.

Since student involvement is often correlated with academic and career success, students

are encouraged to participate in activities outside the classroom setting. A student can be involved in a variety of ways: join a campus club or organization (or start up a new one), serve on a committee, run for office, or apply for various student staff positions. Many opportunities for student involvement are highlighted below.

## ASOIT (Student Government)

(541) 885-1828

The Associated Students of Oregon Institute of Technology (ASOIT) invites the participation and involvement of all students in the governance process. The ASOIT officers serve to represent all students of Oregon Tech, and

work to communicate and advocate with all members of the university community. ASOIT officers are charged with adequately representing and interpreting student opinion related to campus policy and procedures, while promoting unity and community among the students of the university com-

munity. Students can participate by getting involved with a club or organization or by serving on a university committee or commission. For further information, visit the ASOIT web page at [www.oit.edu/asoit](http://www.oit.edu/asoit).

## Campus Activities Board

(541) 885-1832

The purpose of the Campus Activities Board (CAB) is to provide quality activities for all students, taking into consideration their

expressed wishes, interests, and needs. CAB funds quality social, cultural, arts and recreational programs for all Oregon Tech students. A broad array of events include bands, comedians, student talent shows, lectures,

discount movie nights, homecoming week, and the Summer Music Series. For additional information, visit the CAB web page at [www.oit.edu/campusactivities](http://www.oit.edu/campusactivities), our Facebook page at [www.facebook.com/oregontechca](http://www.facebook.com/oregontechca).

## Campus Clubs and Organizations

Student clubs and organizations add another important dimension to life on campus. Approximately 50 student organizations and clubs are active each year. Joining an organization is a great way to meet new people and

pursue common interests in a relaxed setting. Almost half of the clubs are related to various academic disciplines, while others are linked to special interests, sports, recreation, spiritual, and social activities. For a list of clubs,

visit the Campus Life web page at [www.oit.edu/campuslife](http://www.oit.edu/campuslife) and click on the "Clubs and Organizations" link.

## Community Service/Volunteerism

(541) 885-1392

The Department of Campus Life serves as a resource for students interested in giving of

their time and talents in volunteer/community service work. Opportunities for service trips as well as local volunteer work in the Klamath Falls community are available.

## Diversity Center (DC)

College Union, 225  
(541) 885-1369

The Diversity Center provides academic, cultural, and social support to all Oregon Tech students, faculty, and staff, and coordinates a variety of educational and social activities throughout the year. Coffee Hour presentations offer a chance for people to learn from

one another and share experiences. Special events are hosted throughout the year and include kava ceremonies, Mardi Gras, Chinese New Year, Cinco de Mayo and Native American Dance and Drumming ceremonies.

The DC also supports diverse clubs, such as the International Student Club, Native American Student Union (NASU), Gay

Straight Alliance (GSA), and others, through staff advising and event planning. The International Club hosts the popular international dinner each year, and NASU has highlighted the Native American culture with the annual Honor Pow wow and traditional salmon bake.

The DC also works closely with the Oregon



Tech community in offering Safe Campus workshops and forums in an effort to create and maintain an environment that supports every student in feeling like they belong and are welcome at Oregon Tech regardless of

gender, race, religion, sexual orientation, age, or abilities.

The DC student lounge provides a comfortable atmosphere where students can gather as

well as study, and offers computers, internet access, a large screen TV, and a kitchen.

Website: [www.oit.edu/diversity](http://www.oit.edu/diversity)  
Email: [diversitycenter@oit.edu](mailto:diversitycenter@oit.edu)

## Greek Life – Fraternity/Sororities

Greek letter organizations have a long-standing presence on the Oregon Tech campus. Phi Delta Theta is a national fraternity and Alpha Sigma Alpha is a national sorority.

Greek life at Oregon Tech is dedicated to community service, high academic standards, and enriching the sense of community on campus. Links to the fraternity & sorority

web pages can be found on the list of campus clubs at [www.oit.edu/clubs](http://www.oit.edu/clubs).

## Hootie's Halloo (New Student Orientation)

(541) 885-1392.

Hootie's Halloo, Oregon Tech's orientation program for new students, is an opportunity for students to be welcomed to the campus and community. The multi-day event gives new students a chance to meet their peers,

faculty members, and administration at Oregon Tech. Hootie's Halloo combines fun, interactive programs with helpful information that will allow new students to feel at home and ready for the start of the new academic year. A team of student leaders plans and coordinates the event with the support

of a staff advisor. For more information on Hootie's Halloo, or to find out about joining the team, visit the web page at [www.oit.edu/orientation](http://www.oit.edu/orientation), our Facebook page at [www.facebook.com/oregontechhhh](http://www.facebook.com/oregontechhhh).

## Housing and Residence Life

Housing Office Residence Hall, A 151  
(541) 885-1094

Housing and Residence Life encourages self-responsibility, a necessary ingredient for the accomplishment of academic, social and personal objectives. Accordingly, every attempt is made to provide the environment to accomplish this aim. Studies have indicated that much of the knowledge required for success in life is gained outside the classroom. Oregon Tech's Housing and Residence Life program provides a vital aspect of a student's educational experience. Emphasis is on providing accommodations that are attractive, safe, reasonably priced and that offer stimulating programs that satisfy individual needs for privacy, community life, diversity in living arrangements and educational growth. In the Housing Office, students can make arrangements for a room, receive assistance with personal matters, consult with staff,

make suggestions for improvements, work out financial details and receive assistance for a variety of housing related concerns and interests.

Residence facilities at Oregon Tech are operated on a self-supported financial basis and house up to 650 male and female students. Living in college housing relieves the student of many time-consuming and expensive tasks, including driving to and from campus. With this extra time and financial savings, students are able to devote more energy to their studies, to participate in non-academic learning experiences, to enjoy recreational and stress-relieving pursuits and to make new and often lifelong friends.

Information about on-campus housing is sent to all students admitted to Oregon Tech. Students living on campus for the first time must sign up for the points plan. If you need

a housing or meal plan application, please contact the Housing and Residence Life Office.

Applications for on-campus housing should be completed and returned as soon as possible to the Housing and Residence Life Office. Space is guaranteed to new students who apply before May 1 for the following academic year.

### Room-and-Board Rates

Room-and-board rates at Oregon Tech are approved by the Oregon State Board of Higher Education and are announced publicly after approval. Current rate information and any other information concerning Housing can be obtained from the Housing and Residence Life Office, or online at: [www.oit.edu/housing](http://www.oit.edu/housing).

## International Student Services

College Union, 225A  
(541) 885-1847

Our mission is to enhance the personal and academic success of international students by providing activities and support that con-

tribute to a broader understanding of people and their cultures. This includes assisting students with immigration concerns, SEVIS regulations, student visas, as well as personal, academic, and social adjustment.

In addition, our office participates in the OUS Study Abroad Program and assists Oregon Tech students seeking educational opportunities to study abroad.

[www.oit.edu/current-students/campus-life/international-students](http://www.oit.edu/current-students/campus-life/international-students)

## Leadership Development

(541) 885-1392.

Campus Life provides ongoing opportunities for Oregon Tech students to develop leadership skills for their personal and professional

growth. The Leadership Academy includes a 2-day leadership retreat early in the Fall quarter, as well as monthly leadership workshops that address topics such as effective communication, time management, event planning,

and more. These programs are open to any Oregon Tech students who have an interest in expanding their leadership skills.

## Outdoor Program (OP)

The Outdoor Program (OP) provides an opportunity to participate in various outdoor activities planned for student enjoyment, including, but not limited to, rafting, caving, mountain climbing, hiking, biking, snowboarding, mountain biking, camping,

and skiing. Most trips are offered at reduced cost to Oregon Tech students. No previous experience is necessary to enjoy the events the OP offers, since the activities are planned for beginners and advanced adventurers alike. In addition to sponsoring trips, the OP

also offers low-cost rentals of equipment for a variety of outdoor activities (equipment includes canoes, tents, backpacks, cross-country skis, snowboards, and more). For more information, visit the OP web page at [www.oit.edu/op](http://www.oit.edu/op).

## Student Media

### The EDGE

Oregon Tech's student newspaper, *The Edge*, is a weekly publication written by students from all majors and produced by a student

staff. Published fall, winter, and spring terms, it is distributed without charge to students. Academic credit is also available by enrolling

in journalism courses. For additional information, visit *The Edge* web page at <http://theedge.oit.edu/news>.

### KTEC Radio Station (89.5 FM)

KTEC is the campus radio station licensed to the Oregon State Board of Higher Education by the Federal Communications Commission and is the oldest FM station in Southern Oregon. Student staff and volunteers manage and operate KTEC, with programs to serve

the interests of the Oregon Tech student body and the Klamath Falls community. Throughout the school year, KTEC provides a varied program schedule of music, educational material and special events. As KTEC staff members, students will practice and

perfect their knowledge by producing both live and pre-programmed broadcasts. For more information, visit the KTEC web page at [www.oit.edu/ktec](http://www.oit.edu/ktec).

### Oregon Technical Broadcasting (OTB)

OTB is the student-run video production program at Oregon Tech. OTB films campus events, operates the closed-circuit TV station on campus, and provides video service to

campus organizations that request them. Anyone interested in TV/video/film productions, acting, or comedy is encouraged to get involved with OTB (no previous experience

is necessary). For more information, visit the OTB web page at [www.oit.edu/otb](http://www.oit.edu/otb).

# University Services

## Bookstore, Tech Nest

College Union  
(541) 885-1050

The Tech Nest is a full-service campus store. Besides textbooks and course packs, the Tech Nest carries a wide variety of contemporary items that students prefer: school, office and residence hall supplies, scientific calculators, writing instruments, emblematic clothing

and gifts, computer supplies, software and general reading books, among others.

Online ordering is available through the bookstore website at [www.oregontech.bkstr.com](http://www.oregontech.bkstr.com). You may buy or rent actual textbooks as well as digital books. Apparel, gift and supplies are available to order online as well. The Tech Nest has a high percentage of used

books in stock. The book buy-back program allows students to sell back books they do not wish to keep after taking a course.

Mailing supplies such as stamps and packing material may be purchased at the Tech Nest, and packages can be shipped via Federal Express from the store.

## Campus Dining

College Union  
(541) 885-1076

Dining services provided by Sodexo Inc. offer a dining program complete with services in several locations across campus, and menu selections that include just about every item you can imagine.

The Marketplace features a wide variety of fresh food designed to satisfy everyone's appetite with food choices to rival restaurant favorites. The Bistro is a quick serve coffee/espresso and light meals venue located on the first floor of the College Union. Hooties, located in the DOW building, and Duffies, located in the Purvine building both offer a

variety of fresh items to get you going in the morning or for a quick pick-me-up between classes. The Night Owl, the residence hall snack bar, is open only at night and offers a selection of beverages and snacks to satisfy that late night hunger.

## Career Services

Learning Resource Center, 228  
(541) 885-1020

The Career Services Office supports student and alumni efforts to develop and achieve career goals. Services include: individual career advising; workshops and classroom presentations on résumé-writing, job interviewing, job search and applying to graduate

school; on-campus employer recruitment, whereby companies and government agencies interview students for career and internship opportunities; Career Fairs, which bring employers and students together on campus to discuss career opportunities informally; career-resource materials and job listings; and a résumé referral service, which supports student applications for employment and

graduate school.

Career Services also coordinates the Student Employment Service, which provides part-time employment for students both on and off campus with local employers. Positions are available through the College Work-Study program or through regular employment.

## Disability Services

Learning Resources Center, 228  
(541) 851-5179  
(541) 885-1072 - text telephone

The Office of Disability Services coordinates academic, housing and program services accommodations for students with documented physical, learning, sensory, psychiatric and other disabilities. Students with disabilities

who anticipate needing services on campus should contact this office well in advance of attendance at Oregon Tech to arrange for timely services.

## Document Resource Center

College Union  
(541) 885-1058

The DRC is a one-stop shop for printing and bulk mailing needs. Services are available to faculty, staff and students.

well as laminating, comb binding and gluing are available at low costs. Electronic job submission provides the campus with access to services and completed jobs can be delivered to campus mail boxes within 24 hours.

Mail services include bulk mailing; mail merge; folding and inserting; and postcard

mailings. Special requests will be addressed on an individual basis.

Hours of operation are 7 a.m. to 5 p.m. Monday through Friday during the academic terms. During college breaks, operational hours are 8 a.m. to 5 p.m.

Black and white, color, digital printing as

# Information Technology Services

Boivin Hall, 123  
(541) 885-1720  
(541) 885-1470 Helpdesk/Service  
(503) 821-1289 Wilsonville Helpdesk

Information Technology Services provides computing and telecommunications resources for the Oregon Tech campuses. Primary service and support areas include e-mail and network storage for all students,

faculty and staff; broadband network connectivity between all Oregon Tech buildings; and advanced technology services such as wired and wireless Internet connections, Internet 2 and interactive videoconferencing. In conjunction with Oregon Tech faculty, staff and students, ITS strives to offer the comprehensive and advanced technologies necessary to meet educational needs and to help facilitate instruction and research on the

Oregon Tech campus.

Oregon Tech offers more than 500 computers available for student use on the Klamath Falls campus. The Wilsonville campus has more than 100 computers for student use. ITS supports the computers and projects in campus laboratories and classrooms to insure proper function and availability for faculty and students.

# Integrated Student Health Center (ISHC)

Integrated Student Health Center  
(541) 885-1800

The Integrated Student Health Center, located at the main campus in Klamath Falls, provides general medical care for illnesses and accidents, medical referral, counseling and wellness programs. Students taking six or more on-campus credit hours are entitled to and encouraged to use the Integrated Student Health Center. Other students can use the Integrated Student Health Center by paying the health fee.

## Health Requirements to Register

The following health requirements must be fulfilled before registration. Documentation of requirements must be submitted to the Oregon Tech Integrated Student Health Center. Failure to complete these requirements will result in a "health hold" on the student's account, affecting a student's ability to conduct Business Office transactions and to register for courses.

1. Completed Health History and TB Risk Assessment forms. These forms are mailed to all students when they confirm registration.
2. Evidence of adequate immunizations (e.g., official immunization record, signed statement by a physician, immunizations on official high school transcript, etc.):
  - Two doses of measles/mumps/rubella vaccine (MMR) are required for all full-time college students born on or after Jan. 1, 1957. The first dose must be given after the first birthday. The second dose must be after 1989.\*

- Recent tetanus (Adacel), hepatitis A/B, polio, varicella (chicken-pox), and meningococcal vaccines are strongly recommended. The Integrated Student Health Center carries most of these vaccines.

\* This requirement is support by: Oregon Revised Statute 433.282 Oregon Administrative Rule 333-050-0130 Center for Disease Control and the Advisory Committee on Immunization Practices (MMWR Weekly June 9, 2006 / 55(22);629-630 American College Health Association Guidelines, Recommendations for Institutional Prematriculation Immunizations, January 2009.

## Services Medical Clinic

Oregon Tech's Integrated Student Health Center health care providers are committed to providing high quality, personalized care. The medical clinic is staffed by a physician, nurse practitioner, registered nurse and office assistants. Diagnosis and treatment of acute and chronic illnesses, birth control and emergency contraception, routine laboratory procedures, immunizations, pharmacy, minor surgery and care of minor injuries are some of the services provided. Major emergencies are referred to Sky Lakes Medical Center adjacent to the Klamath Falls campus. Referrals are made to specialists as needed. Visits are free with low costs for medications, laboratory work and some treatments.

## Counseling Services

Counselors are available to discuss personal, academic and career concerns. Crisis services are available and referrals are made to community resources if needed. Sessions are confidential and are provided free of charge to students enrolled for six or more on-campus

credits. Students enrolled for five or fewer credits can receive one free assessment session, and then may access additional services by paying the Student Health fee.

Personal counseling focuses on concerns such as self-esteem, relationship issues, academic performance, family difficulties and troubled sleep. Some specific issues dealt with are: depression; anxiety, substance abuse, suicide, conflicts with parents, spouses or children; loneliness; dating problems; study skills; coping with past or present abusive situations; and grief.

## Wellness Programs

A Health Educator is on staff to assist students in staying healthy and fit while attending Oregon Tech. Free individual appointments are available for personalized health and fitness programs, BMI testing, nutrition education and smoking cessation. Awareness events and health promotion programs are also provided on a regular basis campus-wide. Please call the Integrated Student Health Center to make an appointment or learn more about various campus-wide wellness activities.

## Student Health Advisory Committee (SHAC)

SHAC serves as an advisory committee to the ISHC. Students provide input on programs and services provided, generate new ideas and participate in wellness and promotion events. All students are welcome to apply to join this committee. SHAC meets on a monthly basis during the academic school year. Call or visit the Integrated Student Health Center to apply.

## Peer Health Educator Program

The Oregon Tech Peer Health Education Leadership program gives students the opportunity to develop public speaking, leadership, and public health skills while providing a resource for health information to the Oregon Tech community. The mission of the program is “Helping people make informed, voluntary, health-promoting behavior changes.” Student volunteers are called Peer Health Educators (PHEs), who work with peers through education and outreach. They receive training to gain facilitation skills, public speaking experience and knowledge about college health issues. Students in good academic standing and with sophomore status or above may apply during Winter Term. Opportunities for others to volunteer

and assist PHEs are available throughout the year. For more information, visit [www.oit.edu/health/peerhealthed](http://www.oit.edu/health/peerhealthed).

## Fees/Charges

Students taking six or more on-campus credit hours pay a Student Health fee. This fee entitles students to services offered by the medical clinic, counseling and wellness programs. Other students can use the center if they pay the health fee. Office visits are free for illness and injury, evaluation, treatment, questions and other reasons. However, additional charges may be necessary for medications, treatments, supplies, immunizations and laboratory tests. Costs for these services and supplies are kept well below the market price for student affordability. No cash is necessary at the time of visit. All medical expenses ren-

dered outside the Integrated Student Health Center from private physicians or hospitals are the student's financial responsibility.

## Student Health Insurance Plan (SHIP)

OIT health insurance is on a voluntary basis. If you do not have health insurance from an alternative source, you are strongly encouraged to look at purchasing the voluntary health insurance plan. International students and students in certain programs/externships will continue to have to meet requirements for health insurance through a hard waiver. The waiver must be completed within the first 14 days of a term before a refund can be given. Once completed, the waiver will cover the entire academic year.

# Library Services

The University Libraries consist of the Main library located on the first and second floors of the LRC building on the Klamath Falls campus, the Shaw Historical Library located on the second floor of the LRC, and the Wilsonville library located on the fourth floor of the Wilsonville campus building. Online catalogs provide access to the collections of the University Libraries, while web-based databases offer students access to extensive information sources. All electronic resources are available on both campuses and via remote access in order to promote student learning regardless of location. Research services include print and electronic reserves, interlibrary loans, individual research assistance, and chat reference. Campus librarians offer class-related instruction in the use of the

library and information resources, workshops on various topics, classes in research methods, and tours

## Main Library

The Main library contains approximately 150,000 volumes, including government documents; access to more than 18,000 print and electronic journals; and unique digital and special collections. For librarian assistance, call 541-885-1773.

## Wilsonville Library

The Wilsonville library houses a print collection on-site focusing on local programs, and will request any other resources as needed. For assistance please call 503-821-1260 or

reach the Wilsonville campus librarian at 503-821-1258.

## Shaw Historical Library

The Shaw Historical Library, established in 1983 by Laurence and Dorothy Shaw, houses collections of books, art, maps, manuscripts, photographic images, and other materials pertaining to the history, cultures, and natural history of the Land of the Lakes—Southern Oregon, Northern California, and Northwestern Nevada— from prehistory to the present. The Library's activities and publications, including the Journal of the Shaw Historical Library, focus on all aspects of the history and natural history of the region. To reach the Shaw Librarian, call 541-885-1686.

# Student Success Center (SSC)

Learning Resources Center, 229  
(541) 851-5179

The Student Success Center (SSC) is a multi-purpose department designed to enrich learning, teaching, and student success at Oregon Tech. The SSC consists of Testing, Tutoring, TOP, Disability, and Career Services. The SSC helps students succeed by providing effective academic assistance, support, and resources through promotion of student learning, personal growth, and programs designed

to enhance instruction, advising, involvement, satisfaction, achievement, retention, persistence, graduation, and post-graduate success. The SSC provides peer tutoring for matriculated Oregon Tech students, academic success (ACAD) classes, accommodations for students with disabilities, test proctoring, a computer laboratory, the campus writing center, as well as many other services to support students, staff, and faculty in an effort to facilitate student success at Oregon Tech. In addition, the SSC assists with faculty ori-

entation, support, and development efforts, including September Institute and Advisor Training for new faculty. It provides ongoing support for faculty to help improve teaching effectiveness and instructional abilities as well as student support skills. The SSC also functions as the University Testing Center by offering testing, distance testing, placement testing, test proctoring, and other standardized testing programs.

The SSC is an integral part of Oregon Tech's

student success initiatives and strives to provide effective programs and services to create a welcoming, supportive, and successful

campus. Visit [www.oit.edu/ssc](http://www.oit.edu/ssc) or [ssc@oit.edu](mailto:ssc@oit.edu) for more information.

## Student Veterans Association

College Union  
(541) 851-5768

The Oregon Tech Veterans Association (OVA) is dedicated to satisfying the needs of any veteran at Oregon Tech during and after their time as a student, staff, or faculty. With the direction of the elected officers of OVA and assistance of the Campus Veterans Service Officer (CVSO), the OVA reach out to the greater Oregon Tech and Klamath community and seek ways of building friend-

ships and partnerships that are based on the same honor, duty, loyalty, and selfless service instilled in all veterans. For more information, visit the OVA web page at [www.oit.edu/current-students/campus-life/ova\\_home](http://www.oit.edu/current-students/campus-life/ova_home).

The Veterans Certifying Official (VCO) works with the Veterans Administration to deliver educational benefits to a variety of veterans, selected reservists, dependents and survivors. All students, including new, transfer or returning, who expect to receive VA

benefits must notify the coordinator in order to start the process of certification. The VCO also administers the satisfactory progress standards for students who are receiving VA educational benefits. See Veterans Satisfactory Progress Standards under the Academic Policies section of this catalog. For more information or to contact the Veterans Certifying Official visit the Registrar's veteran student information page at [www.oit.edu/veterans](http://www.oit.edu/veterans).

## Tech Opportunities Program

Learning Resources Center, 228  
(541) 885-1125

The Tech Opportunities Program (TOP) is a federally funded (Student Support Services TRIO) academic support program designed to assist highly motivated students who are

also low income, first generation or students with disabilities. TOP staff work closely with participating students to comprehensively assess academic and financial needs and to develop personalized plans for college success. Participants may be eligible for a variety of academic support services, including group

and/or individual tutoring and related support; mentoring; networking with other students; college-success workshops and classes; additional academic advising; and limited financial assistance.

## Women's Resource Center

College Union, 225C  
541.885.1067

The Oregon Tech Women's Resource Center (WRC) provides resource and referral information; facilitates programming and interpersonal support; and promotes academic and personal success. Our goal is to promote

and maintain a positive and supportive climate at Oregon Tech. The WRC is here to help women on their journey and offer positive influences that will transform them into future leaders. Honoring the complexities of women's identities, the WRC facilitates choices and change through programs, counseling, and workshops, and serves as the

central resource for educational and support services for women. We offer referrals and supportive contacts on campus and in the community should students need help or support.

Facebook: [www.facebook.com/OITWRC](http://www.facebook.com/OITWRC)  
Website: [www.oit.edu/women](http://www.oit.edu/women)  
Email: [women@oit.edu](mailto:women@oit.edu)

# University Development

Snell Hall, 214  
(541) 885-1130

University Development builds and enhances positive relationships with students, faculty, staff, alumni and friends of the university

through initiatives and activities that embody institutional values and position Oregon Institute of Technology among the nation's leading technological and health professions universities. Fundraising, alumni relations, grant writing and other activities stimulate

and convey the distinctive role and numerous educational, research and public service contributions of Oregon Tech throughout our communities, the nation, and internationally.

## The Oregon Tech Alumni Association

Snell Hall, 215  
(541) 885-0795

The Alumni Relations office promotes interactions and loyalty of alumni and currently enrolled students toward Oregon Institute of Technology. Services and activities include regional social events, student activities, reunions and continuing education programs. Alumni have the opportunity to keep in touch with other alumni through the uni-

versity's alumni Web page and other means of communications regarding their academic major and Oregon Tech.

The Oregon Tech Alumni Association, established in 1949, is guided by the Alumni Advisory Board and exists to support and promote Oregon Tech as a premier learning institution and to provide a structure for alumni affiliation. Membership is free and automatic to anyone who has completed

at least 90 credits at Oregon Tech. Areas of special interest for the Alumni Association include assisting the university with new-student recruitment activities, career networking, social and educational activities and the financial support of Oregon Tech. The Alumni Association is an affiliated organization of the Oregon Tech Foundation.

## The Oregon Tech Foundation

Snell Hall, 213  
(541) 885-1130

The Oregon Tech Foundation is a nonprofit organization that provides private financial support for Oregon Institute of Technology. The Foundation is governed by a Board of Directors that represents a broad range

of community leaders, alumni and private benefactors. The Foundation raises funds to enhance academic programs, to support scholarships and to enrich student life. A related responsibility of the Oregon Tech Foundation is the management of private funds entrusted to it. These funds currently total more than \$17 million, a large part of

which is committed to the support of numerous scholarships that are awarded primarily on the basis of academic achievement and financial need. The Foundation works closely with its affiliated and associated organizations, including the Oregon Tech Alumni Association and the Shaw Historical Library.

## Geo-Heat Center

Boivin Hall, 102  
(541) 885-1750

The Oregon Renewable Energy Center encompasses Oregon Tech's Geo-Heat Center. Established in 1975, Geo-Heat is active in research, technical assistance and information services in geothermal direct-use, small-scale power generation and ground-source heat pumps. Research activities have included hydrology and geochemistry studies, district heating, downhole heat exchangers, heat pumps, agri-business applications, low temperature Rankine cycle power generators and resource assessment.

The Center provides technical assistance for geothermal projects in the area of equipment and materials selection, feasibility studies, design, troubleshooting and economic evaluations. This program is sponsored by the U.S. Department of Energy and the State of Oregon and provides training sessions and information dissemination about the direct applications of geothermal energy, small-scale power generation and ground-source heat pumps.

The Center publishes the Quarterly Bulletin, technical papers, software and monographs on geothermal energy. The staff has made

presentations worldwide and gives tours of local geothermal installations. They are active in professional organizations such as the Geothermal Resources Council, the International Geothermal Association, International Ground-Source Heat Pump Association and ASHRAE. An extensive Web site on geothermal energy is available at: <http://geoheat.oit.edu>.

# Oregon Renewable Energy Center

Purvine Hall, 294  
(541) 885-0755

The Oregon Renewable Energy Center (OREC) was established by the Oregon State Legislature in 2001 to promote energy conservation and renewable energy use in Oregon and throughout the Northwest. This is accomplished through applied research, educational programs and workforce development, and technical assistance and information dissemination. The Center also encompasses Oregon Tech's Geo-Heat Center. OREC draws its strong technical expertise from the Oregon Tech faculty, whose engineers and computer scientists have been involved in applied research in renewable energy for decades.

## OREC:

- Investigates renewable energy technologies and opportunities for using them.
- Assesses which technologies are appropriate for particular circumstances.
- Applies promising technologies with effective instrumentation and controls.
- Evaluates technologies using testing and economic analysis.
- Informs the public through classes, educational materials, and technical data.

Current OREC applied research and applications engineering projects focus on:

- Power conversion and storage – Testing renewable technologies such as solar, fuel cells, and geothermal heat pumps and developing control systems to smoothly integrate renewable technologies into existing facilities and electrical distribution networks.
- Alternative fuel sources – Investigating options to gasoline and diesel for cars and trucks.

Electric vehicles

- Green building technologies – Utilizing green building materials and techniques, and instrumentation, control and testing of buildings that use renewable energy instead of conventional power.

## Renewable Energy Engineering (REE) Degree Program

The Renewable Energy Engineering undergraduate degree program offered by Oregon Tech is the only one of its kind to be ABET accredited. We now also have an MS REE degree. In addition to the REE courses, the general Oregon Tech curriculum includes classes and laboratories in renewable energy and sustainability that are available to students in other disciplines. The BS REE is delivered on both the Wilsonville and Klamath Falls campuses. The MSREE degree is delivered only on the Wilsonville campus.



# Directories

## Governance Oregon University System

The Oregon University System includes seven institutions that provide general, professional and technical educational opportunities throughout the state.

Member institutions are Eastern Oregon University, La Grande; Western Oregon

University, Monmouth; Oregon Institute of Technology, Klamath Falls; Oregon State University, Corvallis; Portland State University, Portland; Southern Oregon University, Ashland; and the University of Oregon, Eugene.

The system is governed by the Oregon State Board of Higher Education, whose members are appointed by the Governor and confirmed by the Oregon Senate. The Board maintains a permanent staff, headed by the Chancellor of the Oregon University System, who is appointed by the Board.

## Oregon State Board of Higher Education

Members and term expiration dates:

Matthew (Matt) W. Donegan, Board President, 2013

Jill W. Eiland, Board Vice President, 2014

Lynda M. Ciuffetti, 2012

Brianna R. Coulombe, 2013

Orcilla Z. Forbes, 2014

Allyn Ford, 2013

James (Jim) L. Francesconi, 2016

Farbodd A. Ganjifard, 2013

Paul Kelly, Jr, 2015

James E. Middleton, 2016

Dr. Emily J. Plec, 2013

Kirk Schueler, 2013

David (Dave) V. Yaden, 2016

## President's Advisory Council

**Cecelia Amuchastegui**, Educational Consultant, 2016

**William Buckley**, Attorney at Law, Buckley LeChevallier P.C., 2014

**Russ Carter**, President, ZCS Engineering, Inc., 2016

**Bill Castle**, President and CEO, South Valley Bank & Trust, 2016

**Ann Cavanaugh**, Vice President, Smith Bates Printing and Design LLC, 2016

**Mary Coucher**, Vice President, Alliances and Business Development, IBM Corp., 2014

**James DeHoog**, General Manager, Environmental Technical Services, Inc., 2014

**Lisa Graham**, Vice President and COO, Bend Research, Inc., 2014

**Denise Honzel**, Healthcare Consultant, 2016

**Gary Johnston**, President, 7L Investments LLC, 2016

**Steven Mays**, President, Electronic Wood Systems, Int., 2014

**Kelley Minty Morris**, Outreach and Development, Citizens for Safe Schools, 2016

**Celia Nunez**, Wilsonville City Council President, 2016

**Martha Schrader**, Former State Senator, District 20, State of Oregon, 2014

**Patricia Smullin**, President, California-Oregon Broadcasting, Inc., 2014

**Paul Stewart**, President and CEO, Sky Lakes Medical Center, 2015

**Steve Vincent**, Regional Business Manager, Avista, 2015

# Oregon Tech Foundation Board of Directors

Lance J. Bishop, President  
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 Diedra Thompson  
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 Joan Staunton  
 Nancy Wendt

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**Mary Ann Zemke**, Oregon Tech  
 Vice President for Finance and  
 Administration  
**James DeHoog**, Oregon Tech Alumni  
 Advisory Board President  
**Steve Kandra**, President, Shaw Historical  
 Library

## Administrative Offices

**President**, Christopher G. Maples

**Provost and Vice President for Academic  
 Affairs**, Bradley Burda

**Vice President for Finance and  
 Administration**, MaryAnn Zemke

**Vice President for Student Affairs and  
 Dean of Students**, Erin Foley

**Associate Provost and Vice President for  
 Research**, Mateo Abo

**Associate Vice President for Strategic  
 Partnerships**, Dolores "Lita" Colligan

**Chief Information Officer and Information  
 Technology Services**, Andy Abbott

**Dean, College of Engineering, Technology  
 and Management**, Charlie Jones

**Dean, College of Health, Arts and Sciences**  
 Vacant

**Academic Agreements**, Marla Edge, Director

**Admissions**, Carl Thomas, Director

**Athletics**, Mike Schell, Director

**Business Affairs**, Sara Reuter, Director

**Campus Life**, Joseph Maurer, Director

**Campus Security**, Ed Daniels, Director

**College Union**, Christopher Dalla, Director

**Distance Education**, Barb DeKalb, Director

**Facilities Services**, Vacant

**Financial Aid**, Tracey Lehman, Director

**Housing and Residence Life**, Mandi Clark,  
 Director

**Human Resources and Affirmative Action**,  
 Ron McCutcheon, Director

**Institutional Research**, David Waite,  
 Director

**Integrated Student Health Center**, James  
 Pittman, Administrative Director

**Library Services**, Kelly Peterson, Director

**Marketing and Communication**, Vacant

**Seattle at Boeing**, John Bridge, Director

**Student Success Center**, Dan Zirix

**Oregon Renewable Energy Center**, Charlie  
 Jones, Interim Director

**Registrar's Office**, Wendy Ivie, University  
 Registrar

# Administration

**Andrew Abbott** (2006), Chief Information Officer, Information Technology Services. B.S. (1968), M.Ed. (1972), University of Maine; M.A. (1980), University of Connecticut.

**Joanna Abbott** (2011), Administrative Coordinator, Housing. B.A. (2003), University of Montana, Missoula; M.P.A. (2009), Arizona State University.

**Jan Abeita** (2005), Access Services Manager, Library Services. A.A. (1987), Clackamas Community College; B.S. (1990), Eastern Oregon University; M.S. (1992), Southern Oregon University.

**Mateo Abov** (2005), Associate Provost and Vice President for Research, Electrical Engineering, and Renewable Energy. B.S. (2002), B.S.E.E. (2002), M.S.E.C.E. (2004), Portland State University; Dipl. Ing. (2003), M.Phil. (2004), Ph.D. (2005), ETSIT-University of Vigo; Exec. Cert. (2007), Massachusetts Institute of Technology; M.B.A. (2011), University of London. Registered Professional Engineer (PE), European Union (COIT No. 12684). Registered US Patent Agent (USPTO Bar Admission No. 64040). Certified Licensing Professional (CLP).

**Linda "Abbie" Allen** (1988), Student Services Specialist, Wilsonville Student Services. B.S. (1969), Western Oregon University; M.S. (1987), Portland State University.

**Holly Anderson** (2012), Campus Visits & Programs Coordinator, Admissions. B.S. (2008), Warner Pacific College.

**Diana Angeli** (2006), Executive Secretary to Vice President, Finance and Administration.

**Angela Archer** (2010), Academic Specialist, Tech Opportunities Program. B.S. (2009), Oregon Institute of Technology.

**Sandra L. Bailey** (2000), Director, Assessment. B.S. (1985), Utah State University; M.Ed. (2005), Oregon State University.

**Jennifer Bavarskas** (2005), Health Educator, Integrated Student Health Center. B.A. (1991), University of Oregon; M.S. (2000), San Jose State University.

**Sonja Bell** (2010), Assistant Registrar, Registrar's Office. B.S. (2005), Oregon Institute of Technology; M.A. (2007), Southern Oregon University.

**Tonya "Toni" Boyd** (1995), Senior Engineer, Geo-Heat Center. B.S. (1994), Oregon Institute of Technology.

**John Bridge** (2011), Program Director, Boeing Operations. B.S. (1982), United States Air Force Academy; M.S. (1985), University of Dayton; Ph.D. (2010), University of Maine.

**Bradley Burda** (1983), Provost and Vice President of Academic Affairs. B.S. (1972), Iowa Wesleyan College; M.A. (1982), California State University, Long Beach.

**Kelly Caleb** (2007), Athletic Trainer, Athletics. A.S. (1996), Oregon Institute of Technology; B.S. (1999), Oregon State University.

**Jean T. Calvo** (2004), Counselor, Integrated Student Health Center. A.A. (1987), Clackamas Community College; B.S. (1990), M.S. (1991), Southern Oregon University.

**Christopher Campbell** (1990), Business Manager, Facilities Services. A.A. (1974), College of the Redwoods.

**Andrew Chiasson** (2011), Program Manager, Geo-Heat Center. M.S. (1999), Oklahoma State University; Ph.D. (2007), University of Wyoming.

**Mandi Clark** (2004), Director, Housing and Residence Life. B.A. (1997), Kansas State University; M.S. (1999), University of Nebraska.

**Jason "Jake" Coatney** (2007), Counselor, Financial Aid. A.A. (2002), College of the Siskiyous; B.S. (2005), Eastern Oregon University.

**Dolores "Lita" Colligan** (2007), Associate Vice President, Strategic Partnerships. B.A. (1975), University of California, Santa Cruz.

**Barbara Conner** (2013), Coordinator of Testing, Tutoring, and Retention. B.S. (1985), Texas A & M; M.Ed. (2004), University of Southern Maine.

**Jeffrey Corkill** (2013), Head Golf Coach, Athletics. B.S. (1976), California Polytechnic University.

**Jason Corwin** (2010), Coach, Volleyball, Athletics. B.A. (1999), Western Oregon University; M.A. (2004), Pacific University.

**Christopher Dalla** (1989), Director, College Union. B.S. (1972), Cornell University; M.S. (1987), University of Pennsylvania, Philadelphia.

**Julie Daniels** (2007), Senior Counselor, Financial Aid. B.A. (2003), Southern Oregon University.

**Krista Darrah** (2006), Accounting Manager, Development. B.S. (1999), Oregon Institute of Technology.

**Barbara DeKalb** (2007), Director, Distance Education. B.S. (1970), Linfield College; M.A.T. (1972), Washington State University.

**Marla Edge** (1983), Assistant Professor; Director, Academic Agreements. B.S. (1976), M.Ed. (1989), Oregon State University.

**Michael Emanuel** (2011), Residence Life Coordinator, Housing. B.A. (2003), B.S. (2003), University of Connecticut.

**Ka'iulani EvansBautista** (2012), Counselor, Admissions. B.S. (2012), Oregon Tech.

**Erin Floyd** (2010), Success Specialist, Student Success Center. B.S. (2008), Corban College.

**Erin Foley** (1999), Vice President of Student Affairs; Dean of Students. B.S. (1988), University of Arizona; M.A. (1991), Michigan State University; Ph.D. (1996), Indiana University.

**Honor Christine Frazier** (2008), Student Programs Coordinator, Campus Life. A.A. (2006), B.S. (2008), Oregon Institute of Technology.

**Michael Garrard** (2007), Coordinator, Sports Marketing/Promotion.

**Alden Glidden** (1978), Associate Professor; Medical Director, Student Health Center. B.S. (1965), University of Michigan, Ann Arbor; M.D. (1969), Wayne State University.

**Bill Goloski** (2011), Manager, Publications and Graphic Design. B.F.A. (2004), Cazenovia College.

**Koichiro Gomyo** (2012), Athletic Trainer, Athletics. B.S. (2010), Indiana State University; M.S. (2012), University of Hawaii.

**Sandi Hanan** (2008), Coordinator, Human Resources. A.S. (1999), Oregon Institute of Technology; B.S. (2013), Oregon Institute of Technology.

**Stephanie Hanson** (2010), Executive Assistant to Vice President of Development and Alumni Relations. A.A. (2000), Oregon Institute of Technology.

**Michael Hedlund** (2012), Head Women's Soccer Coach, Athletics. J.D. (1997), Willamette University; B.S. (1992), University of Oregon.

**Lisa Howard** (2002), Accounts Receivable Manager, Business Affairs. A.S. (1983), Oregon Institute of Technology.

**Roger Hulet** (1983), Grounds Supervisor, Physical Plant. A.A. (1973), A.A. (1975), Pierce College.

**Wendy Ivie** (1999), University Registrar, Registrar's Office. B.S. (1997), Oregon State University; M.S. (2005), Southern Oregon University.

**Charles Jones** (1997), Dean, College of Engineering, Technology, and Management. B.S. (1969), University of Utah; M.B.A. (1982), University of Puget Sound; Ph.D. (2002), Utah State University. Registered Professional Engineer, Washington.

**Erik Jorgensen** (2012), Director, Grants Development. B.A. (2007) Columbia University.

**Mark Kasper** (2006), Custodial Supervisor, Facilities Services.

**Jack Kegg** (2011), Head Track & Field and Cross Country Coach, Athletics. B.S. (1996) Western Oregon University.

**James Lake** (1988), Maintenance Supervisor, Facilities Services. A.S. (1984), Sierra College.

**Anna Lambdin** (2010), Counselor, Admissions. B.S. (2010), Oregon Institute of Technology.

**Tracey Lehman** (1999), Director, Financial Aid. A.S. (1986), Mohawk Valley Community College; B.A. (1988), State University of New York; M.S. (2005), Southern Oregon University.

**Thomas Loney** (1994), Associate Director, Athletics. B.S. (1992), M.S. (2000), Southern Oregon University.

**Anne Malinowski** (1990), Assistant Registrar & Veterans Certifying Official, Wilsonville Operations.

**Christopher Maples** (2008), President. B.S. (1980), West Georgia College; M.A. (1985), Ph.D. (1985), Indiana University.

**George Marlton** (2010), Executive Director of Purchasing, Contract Services, and Risk Management. B.A. (2000), University of Washington; J.D. (2005), University of Oregon. Member of Washington Bar.

**Joseph Maurer** (2012), Director, Campus Life. B.A. (1994), Duquesne University; M.A. (1996), University of Denver.

**Ron McCutcheon** (1996), Director, Human Resources and Affirmative Action. B.A. (1972), Carroll College; M.S. (1976), Eastern Michigan University.

**Scott Meredith** (2009), Head Women's Basketball Coach, Athletics. B.A. (1987), M.A. (2000) St. Mary's College.

**Cheryl Meyers** (1989), Executive Assistant, Provost and Vice President of Academic Affairs.

**Brittany Miles** (2011), Industry Outreach Coordinator, Electrical Engineering and Renewable Energy. B.A. (2004), Occidental College.

**Daniel Miles** (1970), Head Men's Basketball Coach, Athletics. B.A. (1968), Southern Oregon University.

**Matthew Miles** (2007), Head Baseball Coach, Athletics. A.A. (1992), Oregon Institute of Technology.

**Matthew Munhall** (2012), Head Men's Soccer Coach, Athletics. B.A. (2007), Principia College; M.S. (2011) Ohio University.

**Valjean Newsome** (1997), Executive Secretary to Dean of Engineering, Technology, and Management.

**Jessica Ormond** (2011), Scholarship Officer/Counselor, Financial Aid. A.A. (2001), Rogue Community College.

**Deanne Pandozzi** (2002), International Student and Diversity Coordinator, Campus Life and SEVIS. B.S. (2010), Oregon Institute of Technology.

**Justin Parnell** (2012), Alumni Relations and Scholarship Coordinator, Development. B.S. (2011), Oregon Institute of Technology.

**Adria Paschal** (2007), Executive Assistant to the President.

**Suzet Petersen** (2002), Assistant Director, Financial Aid. A.A. (1996), B.S. (1998), Oregon Institute of Technology.

**William Proebstel** (2008), Academic Specialist, Tech Opportunities Program. B.A. (2003), M.A. (2008), University of Nevada, Reno.

**Luis Ramirez** (2013), Coordinator, Admissions. B.A. (2010), University of Oregon.

**Stephanie Rasmussen** (2011), Coordinator/Recruiter, Admissions. B.A. (2008) University of Oregon.

**Denise Reid** (2010), Accounting Manager, Business Affairs. B.S. (2008), University of Phoenix.

**Laura Reid** (2007), Coordinator, Tech Opportunities Program. B.S. (2005), Oregon Institute of Technology; M.S. (2012), Kansas State University.

**Sara Reuter** (2009), Director, Business Affairs. B.S. (1972), University of Southern California.

**Anthony "Tony" Richey** (2003), Manager, Information Technology Services. A.A. (1989), B.S. (2005), Oregon Institute of Technology.

**Tracy Ricketts** (2010), Director of Donor Relations, Development. B.S. (1999), University of Oregon.

**Genevieve Riendeau** (2008), Manager of User Services, Information Technology Services. B.S. (2000), Oregon Institute of Technology.

**Linda Riley** (2009), Laboratory and Project Manager, Oregon Renewable Energy Center. B.A. (2004), M.S. (2009), Colorado State University.

**Grace Rusth** (2011), Success Specialist, Student Success Center. B.S. (2009), Oregon Institute of Technology.

**Michael Schell** (1996), Director, Athletics. B.S. (1995), Oregon Institute of Technology.

**Vicky Seger** (2010), Benefits Officer, Human Resources. A.S. (1982), North Dakota State College of Science.

**Jennifer Spencer** (2010), Specialist, Human Resources. B.S. (1982), University of Oregon.

**Greg Stewart** (2004), Head Women's Softball Coach, Athletics. B.S. (1992), Sterling College.

**Nellie Stewart** (2007), Executive Secretary to Vice President, Student Affairs. B.S. (2011), Oregon Institute of Technology.

**Elizabeth Stoddard** (2012), Assistant Director, Boeing Program. B.S. (2001), M.B.A. (2007), City University of Seattle.

**Carl Thomas** (2011), Director, Admissions. B.S. (1994), MiM (2002), Southern Oregon University.

**Patricia VanCurler** (2011), Director, Budget and Business Systems. B.S. (2003) Oregon Institute of Technology.

**Kendal Vreeland** (2012), Coordinator, Wilsonville Admissions. B.S. (2007), Southern Oregon University; M.Ed. (2012), Arizona State University.

**Erika Veth** (2011), Faculty Support Services Manager, Distance Education. B.A. (2004), University of North Carolina; M.A. (2008), University of Alaska, Anchorage.

**David Waite** (2011), Director, Institutional Research. B.S. (1994) Brigham Young University; M.B.A. (1999), California State University, San Marcos.

**Juanita Waites** (2007), Senior Counselor/Psychologist, Integrated Student Health Center. B.S. (1999), Southern Oregon University; M.A. (2001), Ph.D. (2006), Pacific University.

**Harold "Hap" Wells** (1994), Manager, Applications Support. A.A. (1994), Oregon Institute of Technology.

**Shellie Wilson** (2004), Auxiliary Accounting Manager, Business Affairs. A.S. (2001), B.S. (2004), Oregon Institute of Technology; M.B.A. (2009), Southern Oregon University.

**MaryAnn Zemke** (2008), Vice President, Finance and Administration. A.S. (1975), Lake Michigan College; B.A. (1977), Western Michigan University; M.B.A. (1990), Western Michigan University.

**Danny Ziriak** (2012), Director, Student Success Center. B.S. (1989), Evangel University; M.S.M. (2010), Oral Roberts University.

## Instructional Faculty

*This listing reflects faculty for the 2013-14 academic year. In some cases, changes taking effect for 2013-14 are included in the faculty lists under the department descriptions.*

**Mark Ahalt** (2010), Assistant Professor, Management. B.S. (1973), Indiana University of Pennsylvania, M.P.A. (1978), California State University.

**Randal L. Albert** (1984), Professor, Computer Systems Engineering Technology. B.S. (1978), University of Wisconsin, Eau Claire; M.S. (1982), Utah State University; M.S. (1991), Southern Oregon University.

**Seth Anthony** (2011), Assistant Professor, Natural Science. B.A. (2004), North Carolina State University; M.S. (2011), Colorado State University

**Richard L. Bailey** (1991), Professor, Management. B.S. (1984), M.A. (1985), Utah State University. Certified Public Accountant.

**James W. Ballard** (2000), Associate Professor, Mathematics. B.A. (1973), Union College; M.S. (1983), Colorado State University, Fort Collins; Ed.D. (2000), Montana State University.

**Bruce Barnes** (2009), Assistant Professor, Electrical Engineering and Renewable Energy, B.S.E.E. (1978), and M.S.E.E., University of Illinois at Urbana; Ph.D. (2005), University of Idaho.

**Matt Beekman** (2011), Assistant Professor, Natural Sciences. B.S. (2003), M.S. (2006), Ph.D. (2009), University of South Florida.

**Slava Bekker** (2011), Assistant Professor, Natural Sciences. B.S. (2004) University of Illinois, Champaign-Urbana; Ph.D. (2011) University of California, Davis.

**Vanessa Bennett** (2008), Instructor, Medical Imaging Technology. B.S. (2001), Oregon Institute of Technology. Certified Nuclear Medicine Technologist (CNMT).

**Raymond "Jay" Bockelman** (2003), Professor, Computer Systems Engineering Technology. B.S. (1982), Portland State University; M.S. (1992), University of Oregon.

**Todd W. Breedlove** (1999), Professor, Computer Systems Engineering Technology. B.S. (1996), Oregon Institute of Technology; M.S. (1999), Southern Oregon University.

**John Bridge** (2011), Associate Professor, OIT-Seattle at Boeing, Manufacturing and Mechanical Engineering and Technology. B.S. (1982), United States Air Force Academy; M.S. (1985), University of Dayton; Ph.D. (2010), University of Maine. Registered Professional Engineer, Maine and Virginia.

**Kevin J. Brown** (2001), Professor, Communication. A.A. (1986), Ricks College; B.A. (1988), Idaho State University; M.A. (1991), Washington State University; Ph.D. (2000), University of Utah.

**Bradley D. Burda** (1983), Professor, Natural Sciences. B.S. (1972), Iowa Wesleyan College; M.A. (1982), California State University, Long Beach.

**Kerry D. Byrne** (2013), Assistant Professor, Natural Sciences. B.S. (2004), University of California, Davis; Ph.D. (2012), Colorado State University.

**Calvin K. Caldwell** (1986), Professor, Computer Systems Engineering Technology. B.S. (1981), Oregon Institute of Technology; M.S. (1989), California State University, Chico.

**Cara Calvo** (2012), Assistant Professor, Clinical Laboratory Science. B.S. (1983), Oregon Health Sciences University; B.S. (1983), Portland State University; M.S. (1990), University of Vermont; MT (ASCP), SH(ASCP) registered.

**Barry Canaday** (2009), Assistant Professor, Medical Imaging Technology. B.S. (1968), Oregon State University; M.S. (1973), Western Washington University; A.A.S. (1978), Peninsula College; A.A.S. (1992), Spokane Community College.

**Ralph A. Carestia** (1990), Professor, Computer Systems Engineering Technology. B.S. (1974), University of Southern Colorado, Pueblo; M.S. (1980), San Jose State University.

**Richard D. Carson** (2006), Instructor, Medical Imaging Technology. B.S. (1997), Oregon Institute of Technology; M.Ed. (2012), Western Governors University. Registered Technologist (R) (CT) ARRT.

**Christopher L. Caster** (1999), Associate Professor, Medical Imaging Technology. A.A. (1975), Oregon Institute of Technology; B.S. (1979), Eugene Bible College; B.S. (1996), Oregon Institute of Technology; M.Ed. (2002), University of Phoenix.

**Burton D. Clark** (1998), Professor, Natural Sciences. B.S. (1979), University of Massachusetts, Amherst; Ph.D. (1986), The Ohio State University.

**Mark H. Clark** (1996), Professor, Humanities and Social Sciences. B.S. (1984), Rice University; M.A. (1987), University of Houston; Ph.D. (1992), University of Delaware.

**Tina Clarke** (2011), Instructor, Dental Hygiene. B.S. (2001) Oregon Health and Sciences University.

**Robyn L. Cole** (2004), Associate Professor, Medical Imaging Technology. B.S. (2000), Oregon Institute of Technology; M.Ed. (2007), Western Governors University.

**Janita D. Cope** (1998), Associate Professor, Dental Hygiene. A.S. (1972), Portland Community College; B.S. (1993), Oregon Institute of Technology; M.S. (1998), University of Washington.

**Benjamin L. Cornelius** (1980), Professor, Mathematics. B.S. (1972), M.A. (1973), California Polytechnic State University, San Luis Obispo.

**Hope J. Corsair** (2011), Assistant Professor, Electrical Engineering and Renewable Energy. B.S. (1996). M.S. (2005), M.S. (2010), Ph.D. (2012), The Johns Hopkins University.

**Cristina Crespo** (2009), Associate Professor, Electrical Engineering and Renewable Energy. B.S. (2002), M.S. (2004), Portland State University; M.Phil. (2009), Ph.D. (2010), ETSIT-University of Vigo. Registered US Patent Agent (USPTO Bar Admission No. 68725).

**David Culler** (2007), Associate Professor, Mechanical and Manufacturing Engineering and Technology. A.A. (1985), University of New Mexico, Albuquerque; B.S. (1988), M.S. (1990), Ph.D. (1994), New Mexico State University, Las Cruces.

**Hugh D. Currin** (1984), Professor, Manufacturing and Mechanical Engineering and Technology. B.S.M.E. (1974), University of Nevada, Reno; M.S. (1977), Oregon State University; Ph.D. (2008), University of Nevada, Reno. Registered Professional Engineer, Oregon.

**Kate P. Darling** (2001), Instructor, Emergency Medical Services, Paramedic Education. A.A.S. (1997), Oregon Health & Science University; B.A. (1976), College of the Atlantic.

**Don DaSaro** (2010), Assistant Professor, A.S., Metropolitan College, Kansas City Mo. Management. B.S. (1967), University of Missouri, M.B.A. (1991), Marymount University.

**Irina Demeshko-Prosnik** (2006), Assistant Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1996), B.A. (2001), M.S. (1996), M.A. (2001), Far Eastern State Transport University.

**Heidi Denton** (2008), Instructor, Dental Hygiene, ODS College of Dental Sciences. B.S. (1999), Oregon Health & Science University.

**Claudia Devens** (2008), Assistant Professor, Dental Hygiene. A.A. (1974), Diablo Valley College; B.I.S. (2003), Viterbo University; M.S. (2007), University of Wisconsin.

**Jeff Dickson** (2010), Assistant Professor, Management. B.S. (2006), Oregon Institute of Technology.

**Paul T. Dingman** (1987), Associate Professor, Electrical Engineering and Renewable Energy. B.A. (1972), Simpson College; M.S. (1974), University of Iowa.

**Mitchell Duryea** (2009), Assistant Professor Geomatics. B.S. (1984), California University, Fresno, MS (2011), Kaplan University. Registered Professional Land Surveyor, California, Hawaii, Idaho, Nevada, New Mexico, Oklahoma, Oregon and Washington.

**Marilyn A. Dyrud** (1983), Professor, Communication. B.A. (1972), University of the Pacific; M.A. (1974), Ph.D. (1980), Purdue University, West Lafayette.

**Todd Ellingson** (2008), Medical Director, Paramedic Education Program. B.S. (1998), Washington and Lee University; M.D. (2003), Oregon Health & Science University.

**James P. Fischer** (1999), Professor, Mathematics. B.S. (1989), B.A. (1991), Humboldt State University; M.S. (1993), University of New Hampshire; Ph.D. (1998), Oregon State University.

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**Andria "Andie" Fultz** (2012), Assistant Professor, Communication. B.S. (1997), M.S. (2007), Portland State University.

**Abraham Furman** (2001), Associate Professor, Clinical Laboratory Science. B.S. (1970), San Diego State University; B.S. (1972), Loma Linda University; Ph.D. (1980), University of California, Los Angeles. MT (ASCP) registered.

**Iris K. Godwin** (2007), Assistant Professor, Technical Services Librarian, Library Services. B.A. (2000), Rhodes College; M.L.I.S. (2005), University of Tennessee, Knoxville.

**Elizabeth H. Gordon** (2006), Assistant Professor, Dental Hygiene. B.S. (2006), Oregon Institute of Technology; M.Ed. (2010), University of Phoenix.

**Tara Guthrie** (2011) Instructor, Medical Imaging Technology. B.S. (2003) B.S. (2004) Oregon Institute of Technology; Registered Vascular Technologist and Diagnostic Cardiac Sonographer (2005) ARDMS.

**Christopher Hamper** (2012), Instructor, Emergency Medical Services. A.A.S. (2010), Oregon Health & Science University/Oregon Institute of Technology.

**Jeffrey C. Hayen** (2011), Associate Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1984), M.S. (1986), San Diego State University; Ph.D. (1996), California Institute of Technology.

**Paula J. Hendrix** (2011) Instructor, Dental Hygiene. B.S. (1985), Oregon Health Sciences University; M.Ed. (2013), Concordia University.

**Anne V. Hiller Clark** (2001), Associate Professor, Instructional Services and Shaw Historical Library. B.S. (1985), College of William and Mary; M.S. (1990), University of Delaware; M.S.L.I.S. (2004), Drexel University.

**Suzanne D. Hopper** (2005), Associate Professor, Dental Hygiene, ODS College of Dental Sciences. A.A.S. (1981), B.S. (1999), Oregon Institute of Technology; M.A. (2006), University of Phoenix.

**Richard G. Hoylman** (2002), Associate Professor, Medical Imaging Technology. B.S. (1988), Oregon Institute of Technology; M.M. (2006), Southern Oregon University. Certified Nuclear Medicine Technologist (CNMT).

**Michael L. Hughes** (2011), Assistant Professor, Natural Sciences. B.S. (1995), M.S. (1999), Ohio University; Ph.D. (2008), University of Oregon.

**James L. Hulse** (2004), Assistant Professor, Respiratory Care and Polysomnography. A.S. (1980), B.S. (1981), M.P.H. (1983), Loma Linda University; Ph.D. (2009), Andrews University.

**Alishia Huntoon** (2005), Associate Professor, Humanities and Social Sciences. B.S. (1999), University of Wisconsin, Stevens Point; M.S. (2002), Ph.D. (2005), Washington State University.

**Janette A. Isaacson** (2006), Assistant Professor, Distance Education. A.S. (1984), Spokane Community College; B.S. (2005), Oregon Institute of Technology; M.Ed. (1998), University of Phoenix; M.Ed. (2002), Ed.D. (2002), Seattle University.

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**Charles R. Jones** (1997), Professor, Management. B.S. (1969), University of Utah; M.B.A. (1982), University of Puget Sound; Ph.D. (2002), Utah State University. Registered Professional Engineer, Washington.

**Claude I. Kansaku** (1998), Professor, Computer Systems Engineering Technology. B.S. (1983), M.S. (1986), University of Southern California.

**Jenny A. Kellstrom** (1992), Professor, Medical Imaging Technology. A.A.S. (1973), B.S. (1985), Oregon Institute of Technology; M.Ed. (1998), University of Phoenix. Registered Technologist (R), (M), AART.

**Jamie Kennel** (2010), Assistant Professor, Emergency Medical Services. A.A.S. (2009), Oregon Health Sciences University/Oregon Institute of Technology; B.S. (1996), Ferris State University; M.S. (2011), Embry-Riddle Aeronautical University.

**MariaLynn Kessler** (2002), Professor, Humanities and Social Sciences. B.S. (1983), Northeastern University; M.S. (1989), Southern Illinois University, Carbondale; Ph.D. (1994), Florida State University.

**Grant C. Kirby** (2003), Associate Professor, Management. B.S. (1987), Oregon Institute of Technology; M.B.A. (1999), University of Oregon.

**Michael Kirshner** (2007), Assistant Professor, Management. B.S. (1970), D.D.S. (1972), University of Southern California; M.P.H. (2001), University of Washington; Graduate Certificate (2003), Oregon Health & Science University.

**Veronica Koehn** (2012), Assistant Professor, Communication. B.A. (2001), M.A. (2002), University of Colorado at Denver; Ph.D. (2010), University of Denver.

**Bobbi Kowash** (2010), Instructor, Medical Imaging Technology. B.S. Ultrasound Vascular Technology Option (1999) Oregon Institute of Technology.

**Karen E. Kunz** (2001), Associate Professor, Information Systems Librarian, Library Services. B.S. (1978), Oregon State University; M.L.S. (1997), Emporia State University.

**Hui Yun Li** (2006), Professor, Natural Sciences. B.S. (1988), National Taiwan University; M.S. (1990), Michigan State University; Ph.D. (1994), University of Massachusetts, Amherst.

**Roger V. Lindgren** (1999), Professor, Civil Engineering. Dip. (1985) Northern Alberta Institute of Technology; B.Sc. (1989), University of Alberta; Ph.D. (2005), Portland State University. Registered Professional Engineer: Alberta, Nevada.

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**Mason K. Marker** (2003), Associate Professor, Geomatics. B.S. (1995), M.S. (1998), Oregon State University. Professional Land Surveyor, Oregon.

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**Debbie L. McCollam** (1995), Professor, Medical Imaging Technology. B.A. (1990), Oregon Institute of Technology; M.B.A. (1996), Southern Oregon University. Registered Technologist (R, M, ARRT).

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**Adam Wagner** (2010), Instructor, Emergency Medical Services. A.A.S. (2009), Oregon Health Sciences University/Oregon Institute of Technology; B.A. (2003), B.S. (2003), University of Montana.

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**Robyn S. Wilde** (2002), Associate Professor, Natural Sciences. B.S. (1994), Utah State University; M.S. (1996), Ph.D. (2000), University of Nebraska, Lincoln.

**Lawrence J. Wolf** (1998), Professor, Manufacturing and Mechanical Engineering and Technology. A.A. (1959), Harris-Stowe State University; B.S.M.E. (1961), M.S.M.E. (1962), D.Sc. (1971), Washington University, St. Louis; Registered Professional Engineer, Oregon, Missouri; Oregon Tech President Emeritus (Designate); Distinguished Service Professor of the Oregon University System.

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## Faculty Senate Presidents

1965-1966	Eugene A. Wellman
1966-1967	Max A. Saunders
1967-1968	Arthur A. LeCours
1968	George E. Miller
1968-1969	Dalhart R. Eklund
1969-1970	Walter R. Richartz
1970-1971	William L. Bradford, Jr.
1971-1972	Dale W. King
1972-1973	Larsen S. Svanevik
1973-1974	Sherman A. Anderson
1974-1975	Thomas J. Connors
1975-1976	James J. Boyle
1976-1977	Joseph T. Riker
1977-1978	Robert C. DeRosier
1978-1979	Richard H. Zbinden
1979-1980	Gary E. Wehr
1980-1981	Keith L. Spickler
1981-1982	Earl D. Kurtz
1982-1983	Charles V. Higbee
1983-1984	Charles V. Higbee
1984-1985	Edward Silling
1985-1986	Herbert H. Jolliff
1986-1987	Herbert H. Jolliff
1987-1988	Charles E. Harris
1988-1989	Ross S. Carroll
1989-1990	Pearl O. Juris
1990-1991	John V. Stec
1991-1992	James R. Etchison
1992-1993	James R. Etchison
1993-1994	Bradley D. Burda
1994-1995	Bradley D. Burda
1995-1996	Valerie J. Vance
1996-1997	Valerie J. Vance
1997-1998	David C. Warner
1998-1999	David C. Warner
1999-2000	Alberto Bello, Jr.
2000-2001	Mark Clark
2001-2002	Mark Clark
2002-2003	Timothy Thompson
2003-2004	Bradley D. Burda
2004-2005	Bradley D. Burda
2005-2006	Bradley D. Burda
2006-2007	Mark Neupert
2007-2008	Mark Neupert
2008-2009	Marla Miller
2009-2010	Debbie Caldwell
2010-2011	Matt Schnackenberg
2011-2012	Matt Schnackenberg
2012-2013	Dan Peterson

## Emeritus Faculty

**Marshall Ager**, B.S., Assistant Professor, Civil Engineering and Geomatics, 1977-2004.

**Robert E. Baird**, E.E., Professor, Electrical Engineering and Renewable Energy, 1958-1979.

**Lynda M. Baker**, M.F.A., Professor, Humanities and Social Sciences, 1989-2012.

**William Bradford**, M.S., Professor, Medical Laboratory Technology, 1960-1986.

**Judy Bronkey**, M.A., Associate Professor, Director, Ethnic and International Student Services, 1969-1995.

**Gene Bruner**, M.S., Professor, Electrical Engineering and Renewable Energy, 1982-2004.

**Ross Carroll**, Ph.D., Professor of Communication, 1984-2003.

**Thomas J. Connors**, Ph.D., Professor and Vascular Technology Program Director, 1969-1999.

**Harriet Cornachione**, M.S., Professor, Civil Engineering, 1995-2010.

**Michael Cornachione**, M.S., Professor, Civil Engineering, 1992-2010.

**Jesse Crabtree**, Assistant Professor, Civil Engineering Technology, 1947-1976.

**G. Gene Culver**, B.S., Associate Professor, Associate Director, Geo-Heat Center, 1960-1995.

**W.M. Douglass**, M.Ed., Professor and Dean of Administration, 1954-1983.

**Elaine M. Deutschman**, M.B.S., Professor, Mathematics, 1983-2004.

**David Dyrud**, Ph.D., Professor of Communication, 1975-2003.

**James R. Etchison**, M.Ed., Professor and Chair, Electrical Engineering and Renewable Energy, 1986-2004.

**Marian Ewell**, B.S., Assistant Professor, Allied Health Partnerships, Clinical Laboratory Science, 2001-2012.

**Jeanne Ford**, R.N., Assistant Professor, Administrative Director, Student Health Service, 1964-1983.

**C. Fred Foulon**, M.Ed., Professor, Civil Engineering Technology, 1954-1986.

**Polly Francis**, M.S., Professor, Mathematics, 1990-2009.

**James R. Gerhardt**, M.S., Professor, Medical Imaging Technology, 1967-1992.

**Charles C. Glover**, B.S., Associate Professor, Diesel Power Technology, 1966-1990.

**Harold E. Godfrey, Jr.**, B.S., Assistant Professor, Medical Imaging Technology, 1975-1997.

**Yolanda Guran-Postlethwaite**, M.S.E.E., Professor, Electrical Engineering and Renewable Energy, 1986-2004.

**Charles E. Harris**, M.S., Professor, Department of Extended Studies and Summer Session, 1976-1996.

**Irving H. (Bud) Hart, III**, M.S., Professor, Mathematics, 1972-1999.

**Donald R. Hefty**, M.S.E.E., Professor, Electrical Engineering and Renewable Energy, 1973-1993.

**Charles A. Hermach**, M.S., Professor, Manufacturing and Mechanical Engineering and Technology, 1983-1993.

**Fred Hess**, M.S., Professor, Mathematics, 1969-1991.

**Charles V. Higbee**, M.B.A., Professor, Business, 1970-1987.

**Richard C. Hone**, M.Ed., Professor, Medical Imaging Technology, 1991-2001.

**David M. Hull**, M.S., Professor, Civil Engineering Technology, 1962-1987.

**Margaret Huntley**, Professor, Management, 1975-2006.

**Herbert H. Jolliff**, M.S., Professor and Department Chair, Mathematics, 1968-1999.

**Lewis Jones**, M.A., Professor, Computer Systems Engineering Technology, 1969-1986.

**Pearl O. Juris**, M.S., Professor, Nursing, 1977-1992.

**Richard A. King**, M.S.E.E., Professor, Computer Systems Engineering Technology, 1982-2002.

**David G. Korzan**, M.S., Professor, Natural Sciences, 1973-2003.

**Cecil R. Lake**, M.Ed., Professor, Director of Planning and Research, 1949-1986.

**Arthur LeCours**, M.Ed., Professor, Physics, 1959-1982.

**John W. Lund**, Ph.D., Professor, Civil Engineering, and Director, Geo-Heat Center, 1967-1999.

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**James C. McAtee**, M.S., Professor, Dean, Computer Systems Engineering Technology, 1969-1996.

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**Richard M. Moore**, Ph.D., Professor and Director, Wilsonville Operations, 1972-1997.

**W. Howard Morris**, M.Ed., Professor, Physical Education, Director of Athletics, 1962-1992.

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**Gary J. Naseth**, Ph.D., Professor, Humanities and Social Sciences, 1975-2009.

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**Kenneth R. Ostrom**, M.S., Professor, Mathematics-Physics, 1966-1995.

**Alf L. Peterson**, M.S., Professor, Business Technologies, 1969-1990.

**Ralph L. Pettit**, M.S., Professor, Humanities and Social Sciences, 1969-1986.

**Donald Phillips**, M.S., Professor, Computer Systems Engineering Technology, 1972-1995.

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**John R. Puckett**, B.A. Associate Professor, Communication 1986-2012.

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**Wayne Rawson**, M.Ed., Professor, Civil Engineering Technology, 1955-1986.

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# Index

## A

About Oregon Tech	8
Academic Agreements	219
Academic Calendar	6
Academic Forgiveness	32
Academic Honors	34
Academic Policies and Procedures	26
Graduate Programs	131
Academic Programs	21
Academic Records	221
Academic Standing, Undergraduate	26
Academic Standing, Graduate	26
Academic Success, Course Descriptions	135
Accounting	
Certificate	98
Course Descriptions	137
Curriculum, Bachelor Degree	91
Information Technology Option	86
Specialization	97
Accreditation, Northwest Commission on Colleges and Universities	4
Administrative Offices	233
Administrative Offices	233
Admissions Information	11
Advance Credit Program (ACP)	25
Advanced Placement Exams	28
Advanced Standing	26
Affirmative Action and Equal Opportunity	219
Allied Health Education, Course Descriptions	138
Alumni Association	230
Anthropology, Course Descriptions	138
Application Procedures	11
Dental Hygiene	56
Freshman Admission	12
Graduate	131
Medical Imaging Technology	110
Nursing	124
Respiratory Care	129
Applied Mathematics	106
Course Descriptions	184
Curriculum, Bachelor Degree	107
Minor, Applied Mathematics	107
Minor, Statistics	108
Applied Psychology	78
Course Descriptions	204
Curriculum, Bachelor Degree	79
Minor	76
Art, Course Descriptions	138
Articulation Agreements, Transfer	14
ASOIT (Associated Students of Oregon Institute of Technology)	223
Assessment	219
Assistantships, Graduate	132
Associate Degrees	21
Athletics, Recreation and Fitness	222
Auditing Policy	31

## B

Baccalaureate Upper-Division Requirement	35
Biology	117
Curriculum, Bachelor Degree	118
Course Descriptions	139
Minor	120
Biology-Health Sciences	117
Dentistry, Pre-Professional Program	119

Medicine, Pre-Professional Program	119
Pharmacy, Pre-Professional Program	119
Veterinary Medicine, Pre-Professional Program	120
Board of Higher Education	232
Bookstore, Tech Nest	226
Business, Course Descriptions	142
Business Minor	96

## C

Calendar, Academic	6
Campus Dining	226
Campus Life	223
ASOIT (Student Government)	223
Campus Clubs and Organizations	223
Diversity Center (DC)	223
Greek Life - Fraternity/Sororities	224
Hooties Halloo (New Student Orientation)	224
Housing and Residence Life	224
Outdoor Program (OP)	225
Student Media	225
Campus Locations	8
Career Services	226
Catalog of Graduation	33
Certificates	21
Accounting, Post-Baccalaureate Certificate	98
Dispute Resolution Certificate	47
Polysomnographic Technology Certificate	127
Challenge, Course (Credit by Examination)	28
Chemistry, Course Descriptions	148
Civil Engineering	42
Course Descriptions	145
Curriculum, Bachelor Degree	43
Class Drop/Withdrawal Policy	30
Graduate	133
Class Standing (Student Classification)	26
CLEP (College-Level Examination Programs)	27
Clinical Laboratory Science	37
Course Descriptions	150
Curriculum, Bachelor Degree	39
College Union	219
Commencement	33
Communication	45
Course Descriptions	152
Curriculum, Bachelor Degree	45
Dispute Resolution Certificate	47
Human Communication Minor	46
Technical Communication Minor	47
Computer Engineering Technology	48
Concurrent Degree	51
Curriculum, Associate Degree	50
Curriculum, Bachelor Degree	50
Computer Systems Engineering Technology	48
Course Descriptions	154
Concurrent Degrees	33
Consortium Agreement Information	18
Core Values (Mission Statement)	5
Counseling Services	227
Course Challenge	28
Course Descriptions	135
Course Numbering System	135
Course Overload (Excessive Course Load)	31
Course Substitutions	33
Credit by Exam	28
Credit for Prior Experiential Learning	28

**D**

Dead Week	31
Degree Programs	21
Dental Hygiene	56
Course Descriptions	159
Course Descriptions, Extended	161
Curriculum, Associate	58
Curriculum, Bachelor Degree	57
Degree Completion Outreach Program	58
Diagnostic Medical Sonography	109
Curriculum, Bachelor Degree	111
Course Descriptions	163
Diplomas	34
Disability Services	226
Dispute Resolution Certificate	47
Distance Education	24
Document Resource Center	226
Drop, Class	30
Dual Degrees (Concurrent Degrees)	33

**E**

Echocardiography	109
Curriculum, Bachelor Degree	112
Course Descriptions	164
Economics, Course Descriptions	165
Electrical Engineering	60
Concurrent Degree	63
Course Descriptions	166
Curriculum, Bachelor Degree	61, 62
Post-Baccalaureate	63
Electronics Engineering Technology	64
Course Descriptions	168
Curriculum, Bachelor Degree	65
Embedded Systems Engineering Technology	51
Curriculum, Bachelor Degree	52
Emergency Medical Services - Paramedic	40
Curriculum, Bachelor Degree	41
Course Description	173
Emeritus Administration	244
Emeritus Faculty	242
Engineering, Course Descriptions	175
Engineering Technology, Course Descriptions	176
English, Course Descriptions	175
Entrepreneurship/Small Business Management	90
Curriculum, Bachelor Degree	92
Environmental Sciences Program	121
Course Descriptions	178
Curriculum, Bachelor Degree	122
Excessive Course Load	31
Exchange Student Admission	15

**F**

Faculty, Instructional	236
Faculty Senate Presidents	242
Family Educational Rights and Privacy Act	221
Federal Parent Loans for Undergraduate Students (PLUS)	17
Federal Pell Grants	17
Federal Perkins Loan	17
Federal Supplemental Educational Opportunity Grants (SEOG)	17
Federal Work-Study Program	17
Fees	19
Final Exams	32
Financial Aid Programs	15
Application Procedures	16
Budgets	18
Consortium Agreement Information	18

Grants	17
Loan	17
Priority Deadlines	16
Scholarships	17
Foreign Language Requirement	13
Foundation, Oregon Tech	230
Fraternity/Sororities	224
Freshman Admission	12

**G**

General Education Requirements	34
General Information	4
Geographic Information Systems, Course Descriptions	179
Geography, Course Descriptions	179
Geo-Heat Center	230
Geology, Course Descriptions	179
Geomatics	72
Course Descriptions	180
Curriculum, Bachelor Degree - GIS	74
Curriculum, Bachelor Degree - Surveying	73
Minor, GIS	75
Minor, Surveying	75
Governance Oregon University System	232
Grade Point Average	30
Grading System	30
Graduate Programs	131
Admissions and Academic Policies	131
Assistantships	132
Graduation	33
Honors	34
Graduation Requirements	33
Greek Life	224
Green Belt, Six Sigma Certification	97

**H**

Health Care Management	81
Curriculum, Administration option	81
Curriculum, Clinical option	82
Curriculum, Radiological Science option	83
Health Center (ISHC)	227
Health Education, Course Descriptions	182
Health Informatics Curriculum	89
Health Insurance Plan, Student	228
Health Sciences, Course Descriptions	183
Help Desk	227
High School Course Requirements	13
High School Transition Program	25
History, Course Descriptions	182
Hooties Halloo	224
Housing and Residence Life	224
Human Communication Minor	46
Humanities and Social Sciences	76
Applied Psychology	78
Curriculum, Bachelor Degree	79
Minor, Applied Psychology	77
Minor, International Relations	76
Minor, Medical Sociology	76
Oregon Transfer Module (OTM)	79
Humanities, Course Descriptions	183

**I**

Incompletes	30
Information Technology	85
Curriculum, Bachelor Degree - Accounting	86
Curriculum, Bachelor Degree - Applications Development	87
Curriculum, Bachelor Degree - Business/Systems Analysis	88

Curriculum, Bachelor Degree - Health Informatics . . . . .	89
Information Technology Services . . . . .	227
In Progress (IP) Grade . . . . .	31
Instructional Faculty . . . . .	236
Integrated Student Health Center (ISHC) . . . . .	227
Intercultural Studies . . . . .	35
International Business Minor . . . . .	96
International Relations Minor . . . . .	76
International Student Admission . . . . .	14
Intramural Sports . . . . .	222

**J**

Journalism, Course Descriptions . . . . .	184
---	-----

**K**

Klamath County Scholarship . . . . .	17
--------------------------------------	----

**L**

Leadership and Diversity Scholarships (LAD) . . . . .	18
Leadership Development . . . . .	225
Learning Outcomes . . . . .	9
Library Services . . . . .	228
Library Fines and Charges . . . . .	20
Lifetime Transcripts . . . . .	19
Long Term Loan . . . . .	17

**M**

Management . . . . .	80
Accounting, Post-baccalaureate Certificate . . . . .	98
Course Descriptions . . . . .	194
Curriculum, Bachelor Degree - Accounting . . . . .	91
Curriculum, Bachelor Degree - Entrepreneurship/Small Business Management . . . . .	92
Curriculum, Bachelor Degree - Marketing . . . . .	93
Curriculum, Bachelor of Applied Science in Technology and Management . . . . .	95
Degree Completion . . . . .	80
Health Care Management . . . . .	81
Curriculum, Administration option . . . . .	81
Curriculum, Clinical option . . . . .	82
Curriculum, Radiological Science option . . . . .	83
Information Technology . . . . .	85
Curriculum, Bachelor Degree - Accounting . . . . .	86
Curriculum, Bachelor Degree - Applications Development . . . . .	87
Curriculum, Bachelor Degree - Business/Systems Analysis . . . . .	88
Curriculum, Bachelor Degree - Health Informatics . . . . .	89
Minor, Information Technology . . . . .	96
Minor, Business . . . . .	96
Minor, International Business . . . . .	96
Marketing . . . . .	93
Operations Management . . . . .	94
Curriculum, Bachelor Degree . . . . .	94
Renewable Energy Management Emphasis . . . . .	97
Six Sigma Green Belt Emphasis . . . . .	97
Management Information Systems, Course Descriptions . . . . .	195
Manufacturing Engineering Technology . . . . .	99
Concurrent Degree . . . . .	102
Course Descriptions . . . . .	190
Curriculum, Bachelor Degree . . . . .	101
Graduate Degree . . . . .	100
Marketing and Communication . . . . .	220
Master of Science . . . . .	21
Civil Engineering . . . . .	43
Manufacturing Engineering Technology . . . . .	100
Renewable Energy Engineering . . . . .	70

Mathematics . . . . .	106
Applied Mathematics Minor . . . . .	107
Applied Statistics Minor . . . . .	107
Course Descriptions . . . . .	184
Curriculum, Bachelor Degree . . . . .	107
Matthews Loan . . . . .	17
Mechanical Engineering . . . . .	102
Concurrent Degree . . . . .	102
Course Descriptions . . . . .	186
Curriculum, Bachelor Degree . . . . .	103
Mechanical Engineering Technology . . . . .	104
Concurrent Degree . . . . .	102
Course Descriptions . . . . .	188
Curriculum, Bachelor Degree . . . . .	105
Medical Imaging Technology . . . . .	109
Admission Requirements . . . . .	110
Course Descriptions . . . . .	198
Curriculum, Bachelor Degree - Diagnostic Medical Sonography . . . . .	111
Curriculum, Bachelor Degree - Echocardiography . . . . .	112
Curriculum, Bachelor Degree - Nuclear Medicine Technology . . . . .	112
Curriculum, Bachelor Degree - Radiologic Science . . . . .	113
Curriculum, Bachelor Degree - Vascular Technology . . . . .	114
Degree Completion - Diagnostic Medical Sonography . . . . .	114
Degree Completion - Echocardiography . . . . .	115
Degree Completion - Radiological Science . . . . .	115
Degree Completion - Vascular Technology . . . . .	116
Specialization - Picture Archiving and Communication Systems (PACS) . . . . .	114
Medical Services . . . . .	227
Military Credit . . . . .	27
Minimum Grade Standards . . . . .	27
Minors . . . . .	33
Applied Mathematics . . . . .	107
Applied Statistics . . . . .	108
Biology . . . . .	120
Business . . . . .	96
Geographic Information Systems (GIS) . . . . .	75
Human Communication . . . . .	46
Information Technology . . . . .	96
International Business . . . . .	96
International Relations . . . . .	76
Medical Sociology . . . . .	76
Psychology . . . . .	77
Surveying . . . . .	75
Technical Communication . . . . .	47
Mission Statement . . . . .	5
Multicultural and International Student Services . . . . .	224
Music, Course Descriptions . . . . .	198

**N**

Natural Sciences . . . . .	117
Biology . . . . .	117
Biology-Health Sciences . . . . .	117
Biology Minor . . . . .	120
Curriculum, Bachelor Degree - Biology-Health Sciences . . . . .	118
Dentistry, Pre-Professional Program . . . . .	119
Medicine, Pre-Professional Program . . . . .	119
Pharmacy, Pre-Professional Program . . . . .	119
Veterinary Medicine, Pre-Professional Program . . . . .	120
Newspaper, The Edge . . . . .	225
Non-Admit Students . . . . .	14
Non-Discrimination Policy . . . . .	4
Northwest Commission on Colleges and Universities . . . . .	4
Nuclear Medicine Technology, Course Descriptions . . . . .	198
Nursing . . . . .	124
Curriculum, Bachelor Degree . . . . .	124
Oregon Health & Science University School of Nursing . . . . .	124



**O**

Operations Management	94
Curriculum, Bachelor Degree	94
Oregon Health & Science University School of Nursing	124
Oregon Opportunity Grant	17
Oregon Renewable Energy Center	231
Oregon Tech Foundation	230
Board of Directors	233
Scholarships	18
Oregon Transfer Module (OTM)	79
Orientation	224
Outdoor Program (OP)	225
Oregon University System	232

**P**

Paramedic Education	40
Parking Fees	20
Philosophy, Course Descriptions	202
Physical Education	130
Physical Education, Course Descriptions	199
Physics, Course Descriptions	202
Picture Archiving and Communication Systems (PACS)	114
Placement Testing	15
Political Science, Course Descriptions	203
Polysomnographic Technology	126
Course Descriptions	203
Curriculum, Associate Degree	127
Curriculum, Certificate	127
Practicum Requirements	14
Pre-college/Youth Programs	25
Presidential Scholarships	17
Presidents Advisory Council	232
Presidents Welcome	5
Probation, Academic	26
Psychology, Course Descriptions	204

**Q**

Quarter System	26
----------------	----

**R**

Radiologic Science, Course Descriptions	209
Reciprocity Agreements	19
Refunds, Tuition and Fees	20
Registrars Office	221
Renewable Energy Engineering	67
Concurrent Degree	63
Concurrent Degree in Electrical Engineering	70
Concurrent Degree in Environmental Sciences	69
Course Descriptions	211
Curriculum, Bachelor Degree	68
Curriculum, Masters Degree	71
Repeat Policy	31
Residency	19
Respiratory Care	128
Course Descriptions	207
Curriculum, Bachelor Degree	129
Degree Completion	129
ROAD (Registration, Opportunity and Discovery)	15
Room and Board Costs	20

**S**

Scholarships	17
Seattle at Boeing	24
Senate, Student	223
Senior Citizen Instruction Fee	20
Shaw Historical Library	228
Six Sigma Green Belt Emphasis	97
Social Security Number Disclosure and Consent Statement	12
Sociology, Course Descriptions	215
Software Engineering Technology	53
Curriculum, Associate	55
Curriculum, Bachelor Degree	54
Sororities	224
Spanish, Course Descriptions	215
Speech, Course Descriptions	215
Strategic Partnerships and Government Relations	220
Student Affairs	220
Student Media	225
Student Success Center	228
Summer Term	23
Summer Youth Camp Activities	25
Surveying	72

**T**

Tech Fit	222
Tech Opportunities Program	229
Transfer Admission	14
Transfer Credit	26
Travel and Tourism	97
Tuition and Fees	19
Tutoring, Student Success Center	228

**U**

Undergraduate Programs	21
University Development	230

**V**

Varsity Team	222
Vascular Technology, Course Descriptions	216
Veterans Satisfactory Progress Standards	32
Veterans Services	229

**W**

Warning, Academic	26
Western Undergraduate Exchange (WUE)	16
Wilsonville Library	228
Withdrawal	30
Womens Resource Center	229
Work-Study Program	17
Writing, Course Descriptions	217

**Y**

Youth and High School Programs	25
High School Transition Program	25
Youth Camps	25