University of Massachusetts Lowell

Continuing Studies, Corporate and Distance Education
http://continuinged.uml.edu

part-time courses, degrees & certificates

Undergraduate Programs

2007-2009

BUSINESS ADMINISTRATION
CIVIL ENGINEERING TECHNOLOGY
COMPUTER SCIENCE
CRIMINAL JUSTICE
COMMUNICATIONS
DATABASE MANAGEMENT
ELECTRONIC ENGINEERING TECHNOLOGY
ENGLISH
GRAPHIC DESIGN
HISTORY
HOMELAND SECURITY
INFORMATION TECHNOLOGY
LIBERAL ARTS
MANAGEMENT
MANUFACTURING TECHNOLOGY
MATHEMATICS
MECHANICAL ENGINEERING TECHNOLOGY
MULTIMEDIA
PARALEGAL STUDIES
PLASTICS MANUFACTURING
PSYCHOLOGY
TECHNICAL WRITING
WEBSITE DEVELOPMENT

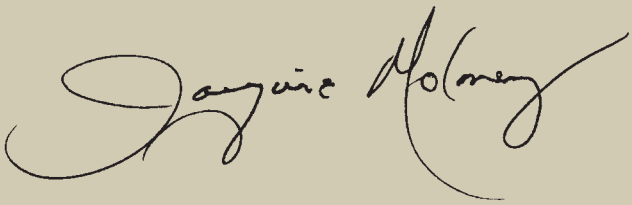
FROM THE EXECUTIVE VICE CHANCELLOR

Jacqueline F. Moloney
Executive Vice Chancellor
University of Massachusetts Lowell

UMass Lowell's Division of Continuing Studies, Corporate and Distance Education is an exciting place to pursue your education through one of the high quality academic programs outlined inside this catalog. Our dedicated faculty and staff have developed a comprehensive suite of programs that will enable you to maximize your learning experience through a rich mix of delivery methods including online, on-campus, on site at companies, accelerated courses and many other options, all designed to provide you with the kind of choices you need to be successful.

Our Division has been ranked among the finest in New England and is a national award winner for innovative programs. Inside you will see a broad scope of programs covering an exciting range of topics all designed to help you to achieve your goals for the future. Please take a moment to review this catalog and if you have any questions, call one of our caring staff or faculty at (978) 934-2474.

My best wishes for your future success,



UMass Lowell has a variety of **FLEXIBLE COURSES**, **DEGREES** and **CERTIFICATE PROGRAMS** to help you **OBTAIN YOUR GOALS!**

As a fully accredited university, UMass Lowell offers undergraduate and graduate degrees and certificate programs that are both flexible and affordable. Our faculty advisors will work with you to evaluate transfer credits and help you to map out an educational program that suits your interests and goals.

With a variety of conveniently scheduled courses held on campus, online, and at area companies, UMass Lowell is committed to providing you with the education and skills you need for continued success throughout your life.

UMASS University of Massachusetts Lowell

NEED MORE INFORMATION? VISIT OUR WEBSITE!
http://continuinged.uml.edu
For the latest information on degrees and certificate programs, current course schedules, course descriptions, registration and tuition information, academic calendars, and so much more.

Have the best of both worlds...
on campus and online

We know that balancing your life outside of school can be overwhelming… That's why we offer working professionals the best of both worlds so that they can take courses on campus, online, or as a mix of on campus and online courses.

"I was able to count the courses I took as part of my certificate towards my bachelor's degree. Now I have two valuable credentials on my resume — a very focused Certificate in UNIX along with a more extensive Bachelor's Degree in Information Technology"

Elizabeth Scofield,
Recent UML Graduate

Our Short-Term Certificate Programs Bring You One Step Closer to Your Degree Faster Than You Ever Imagined Possible...

Designed for those who want to obtain marketable skills within a concentrated time frame, these short-term certificate programs consist of a series of credit courses which, when taken together, demonstrate expertise in a specific area. Many of the courses leading to these certificate programs can also be applied towards additional certificate programs as well as towards a part-time degree program. Students often opt to pursue more than one certificate at a time, or they count their certificate courses towards a part-time degree.

PART-TIME CERTIFICATE PROGRAMS

- Computer Assisted Manufacturing — **Available on campus or online!**
- Computer Engineering Technology
- Contemporary Communications — **Available on campus or online!**
- Database Management Technologies
- Data/Telecommunications — **Available on campus or online!**
- Electronics Technology
- Graphic Design & Digital Imaging
- Information Technology — **Available on campus or online!**
- Land Surveying
- Manufacturing Technology
- Multimedia Applications — **Available on campus or online!**
- Nutrition
- Paralegal Studies — **Available on campus or online!**
- Plastics Engineering Technology
- Security Management and Homeland Security — **Available on campus or online!**
- Spanish and Latin American
- Technical Writing
- UNIX — **Available on campus or online!**
- Wastewater Treatment
- Water Treatment
- Website Design & Development — **Available on campus or online!**

Do You Have Questions About Pursuing a Degree or Certificate Program?

Call Our Student Support Center at (978) 934-2474!

We're committed to your success!

Our student support specialists are there to help you with your course selections and they can work with you to map out your progress through your degree or certificate program. You can also email the Student Support Center at Continuing_Education@uml.edu

The Flexibility You Need to Complete Your Degree!

UMass Lowell offers a wide selection of degree programs on campus, online, or in a blended format. Our accelerated courses, flexible scheduling and convenient learning formats make it easier than ever for you to achieve your educational goals.

Students who have graduated from high school or who have earned a high school equivalency certificate are invited to apply into these programs.

PART-TIME DEGREE PROGRAMS

- A.S. in Civil Engineering Technology
- B.S. in Civil Engineering Technology
- A.S. in Civil Engineering Technology: Surveying Option
- A.S. in Electronic Engineering Technology
- B.S. in Electronic Engineering Technology
- A.S. in Mechanical Engineering Technology
- B.S. in Mechanical Engineering Technology
- B.S. in Mathematics
- B.S. in Mathematics: Statistics Concentration
- B.S. in Mathematics: Teacher Concentration
- B.S. in Applied Mathematics
- B.S. in Criminal Justice
- B.S. in Criminal Justice: Paralegal Option
- A.S. in Information Technology — **Available on campus or online!**
- B.S. in Information Technology — **Available on campus or online!**
- B.S. in Information Technology: Business Minor — **Available on campus or online!**
- 2nd B.S. in Information Technology
- B.L.A. / Bachelor of Liberal Arts — **Available on campus or online!**
- B.S. in Psychology
- A.S. in Management
- B.S.B.A. — Bachelor of Science in Business Administration

Interested in having
onsite training
at your facility? **Call (978) 934-2495!**

- Clinical Lab Sciences
- Composite Materials
- Computer Science
- Computer Aided Design: AutoCAD®, Pro-ENGINEER®, SolidWorks®
- Data/Telecommunications
- Electronics Technology
- Embedded Systems
- Emergency Preparedness Training
- Engineering Technology
- Geometric Dimensioning and Tolerancing (GDT)
- Health Professions
- Information Technology
- Instructional Design & Multimedia
- Computer Programming: C, C++, C#; Visual Basic, .NET, Java, Perl, etc.
- LabVIEW™
- LINUX®
- Management Training
- Manufacturing Training
- Marketing
- Microsoft® Applications Training
- Nanotechnology & Nanomanufacturing
- Oracle® Database Administration
- Project Management
- Plastics Manufacturing
- Quality Assurance & Testing
- Relational Databases
- Software Project Management
- Security Management
- Six Sigma®
- UNIX® & UNIX Shell Programming
- Website Design & Development
- Wireless Communications
- And Many More!

SOME OF THE COMPANIES WE HAVE SERVED:

- Acton Research Corporation
- Allegro Systems
- Analog Devices
- Analogic Corporation
- Anheuser-Busch
- BAE Systems
- BorgWarner
- Bristol-Meyers Squibb
- Brooks Automation
- Clariant
- Dell Computers
- Proctor & Gamble - Gillette South Boston Manufacturing Center
- Hewlett-Packard
- Honda of America
- Inhale Therapeutics
- Iomega
- Juniper Networks
- KaZaK Composites, Inc.
- Lucent Technologies
- Mass Biolabs
- Medtronic
- Mercury Computer Systems
- NetScout Systems
- Raytheon Systems
- Saint-Gobain Ceramics & Plastics, Inc.
- Spectral Sciences
- Textron Systems
- Unisphere
- U.S. Surgical
- And Many Others...

Customized Training and corporate education programs

Developed Around Your Company's Specific Needs

With a large selection of courses, expert instructors and state-of-the-art research programs, the University of Massachusetts Lowell serves as an important educational resource for companies nationally and internationally. The University – well-known for its signature programs in engineering, information technology, computer science, management, health, and manufacturing – provides professional training opportunities on campus and at numerous corporate locations worldwide.

Looking for training in an area not mentioned here? Call our Corporate Training Division at (978) 934-2495 to speak with someone about offering credit or noncredit training in your area of interest.

Seminars, Training & Workshops

http://continuinged.uml.edu/corporate/signature.htm

Continuing Studies offers several intensive noncredit seminars throughout the year, designed to meet the high-priority training needs of today's professionals.

Project Management Seminars
Students can pursue a complete noncredit certificate in Project Management (see right) or they can take the courses individually, providing they have any prerequisite knowledge that may be required. Visit the website for current course availability.

Engineering Technology Seminars
Courses such as *Basic Electronics*, *Advanced Electronics* and *LabVIEW* for engineering professionals are offered regularly throughout the year.

Professional Communication Seminars
Effective Business Writing and other business skills seminars are available for employees looking to brush up their professional communications skills.

Onsite Training in Biosciences

Working collaboratively with the University's research faculty, Continuing Studies offers training to numerous pharmaceutical, health care and life science companies in areas ranging from *Bioreactors Aseptic Processing* to *Cellular and Molecular Bioscience*.

Plastics Seminars & Workshops

UMass Lowell is a nationally recognized leader in plastics education programs. In cooperation with the University's Department of Plastics Engineering, Continuing Studies offers several highly effective seminars and workshops throughout the year on plastics manufacturing. **For more information, visit http://continuinged.uml.edu/plastics**

Project Management Certificate Program

UMass Lowell's noncredit Certificate Program in Project Management provides you with the opportunity to learn more about the latest tools and business trends that many successful companies are using today.

Continuing Studies offers free Project Management Information Sessions at its Open House each semester. To find out more about the Project Management Certificate Program, call (978) 934-2473.

Optional Introductory Seminar:
00.613 Project Management Boot Camp

Required Seminars: (3)
00.608 Project Management: Planning and Scheduling
00.609 Project Management: Resources and Budgeting
00.614 Risk Management

Elective Seminars: (Choose 3)
00.615 Team Building
00.616 Leadership Skills
00.618 Negotiation Skills
00.610 MS Project
00.620 Client Relationship Management

PMI Registered Education Provider — Project Management Institute

UMass Lowell is a registered provider of project management training by the Project Management Institute (PMI).

Award Winning

online learning programs

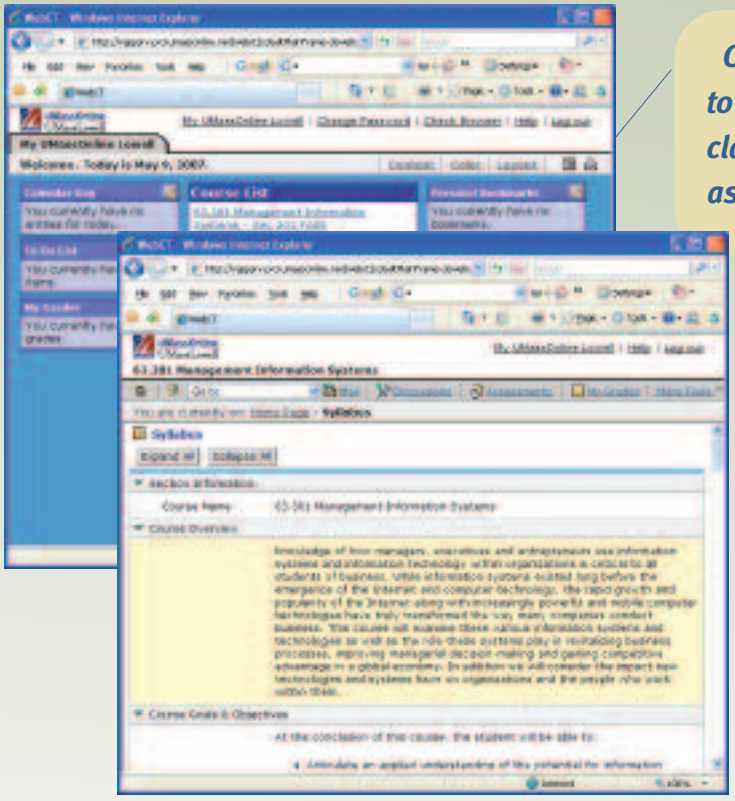
Take a course or finish your degree online!

As one of the largest online programs in New England, UMass Lowell offers a wide array of fully-accredited, undergraduate and graduate level courses, degrees, and certificates to students all over the world. Courses are instructor-led, limited in size, and offer the same high-quality instruction as the campus-based courses.

SLOAN-C™

UMass Lowell is a Recognized Leader in Online Education

UMass Lowell's Online Programs have earned national recognition as a leader in distance education. After winning numerous Sloan Foundation grants, UMass Lowell captured three national Sloan Consortium's awards for innovative programming, faculty development and online teaching.



Online courses at UMass Lowell feature an easy-to-use interface. Students interact with faculty and classmates using a variety of web-based tools such as chat, email and threaded discussion boards.

Q. Are UMass Lowell's online courses accredited?

A. UMass Lowell is a fully accredited university. The majority of the online courses offered by UMass Lowell online are credit-bearing and can be applied into several degree and certificate programs.

Q. Can I see what the online course looks like before I register?

A. Absolutely! Visit our website at http://continuinged.uml.edu/online to test drive the course demo, or if you live in the Lowell region you can join us at one of our online course orientation sessions . . . check our course listings bulletin for dates/times.

Q. Do I ever need to come to campus?

A. The majority of our online courses do not require any on-site sessions. For the few courses that may require proctored exams, arrangements can be made for an off-site proctor (see website for details).

visit http://continuinged.uml.edu/online
to test drive an online course!

ONLINE DEGREE PROGRAMS:

Associate's Degree in Information Technology

Bachelor's Degree in Information Technology

Bachelor's Degree in Information Technology: Business Minor

Bachelor's Degree in Liberal Arts

Bachelor's Degree in Psychology

Master's Degree in Criminal Justice

Master's Degree in Educational Administration (M.Ed.)

Master's Degree in Reading and Language (M.Ed.)

Master's Degree in Curriculum and Instruction (M.Ed.)

Master's Degree in Curriculum and Instruction with a Concentration in Science Education (M.Ed.)

Master's Degree in Business Administration (MBA)

ONLINE UNDERGRADUATE CERTIFICATE PROGRAMS:

Certificate in Contemporary Communications

Certificate in Data/Telecommunications

Certificate in Information Technology

Certificate in Multimedia Applications

Certificate in Paralegal Studies

Certificate in Security Management and Homeland Security

Certificate in UNIX

Certificate in Web Design and Development

ONLINE GRADUATE CERTIFICATE PROGRAMS:

Certificate in Behavioral Intervention in Autism

Certificate in Clinical Pathology

Certificate in Domestic Violence Prevention

Certificate in Forensic Criminology

Certificate in Foundations of Business

Certificate in Plastics Engineering Fundamentals

Certificate in Security Studies

Many of the courses taken as part of the online certificate programs can be counted toward certain online degree programs.

For current offerings, technical requirements, and additional information, or to see if online learning is right for you, visit http://continuinged.uml.edu/online

Online Student Support is Just a Mouse Click or a Phone Call Away!

Academic Support

Online students have access to the same dedicated Student Support Specialists that our on campus students have. Our online Student Support Specialists can help you with your course selections and they can work with you to map your progress through a degree or certificate program, whether you're taking courses entirely online, or as a mix of online and on campus courses. For academic support, email our Student Support Specialists at Continuing_Education@uml.edu

Technical Support

UMass Lowell online courses offer 24X7 technical support. For technical support during business hours, email onlinelearning@uml.edu or call 1 (800) 480-3190 from 8:30am to 5:00pm, Monday through Friday. Weekends, evenings after 5:00pm and holidays, call 1 (800) 569-6505.

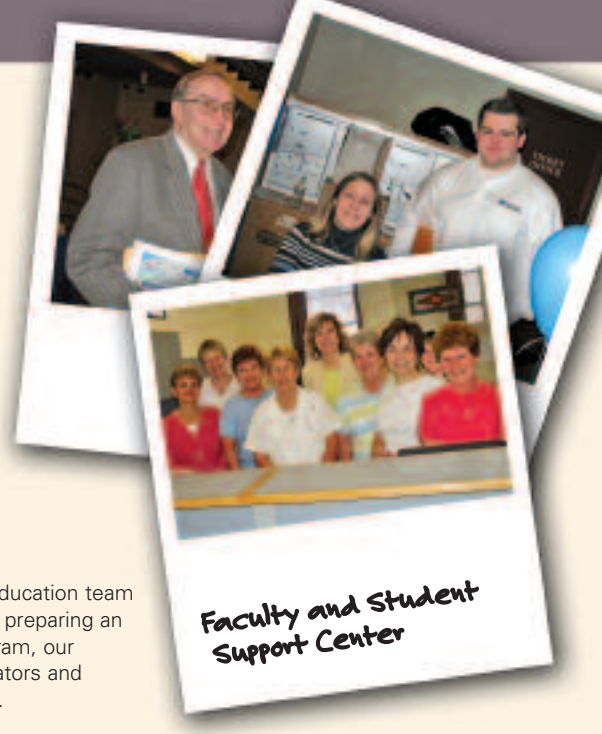
Questions? Call Our Faculty & Student Support Center at (978) 934-2474!

"I had been looking for a non-traditional degree program that would fit in with my schedule, and then I found the Online Liberal Arts program at UMass Lowell. I've taken numerous courses in a variety of settings, but the online program at UMass is by far the best environment I've seen for a non-traditional delivery of courseware."

Leslie Davis,
Online Student

Continuing Studies' Faculty and Student Support Specialists...

We can help you complete your degree!



Our Faculty and Student Support Specialists can help you:

- **Build an education program that suits your needs**
- **Find the quickest path to fulfilling requirements through transfer credits and other mechanisms**

If you are interested in completing a degree program, UMass Lowell's education team can help you reach your educational goals. Whether transferring credits, preparing an education portfolio, or mapping out a certificate or degree program, our UMass Lowell team of Faculty Program Coordinators and Student Support Specialists can help you.

Stop by the Student and Faculty Support Center!

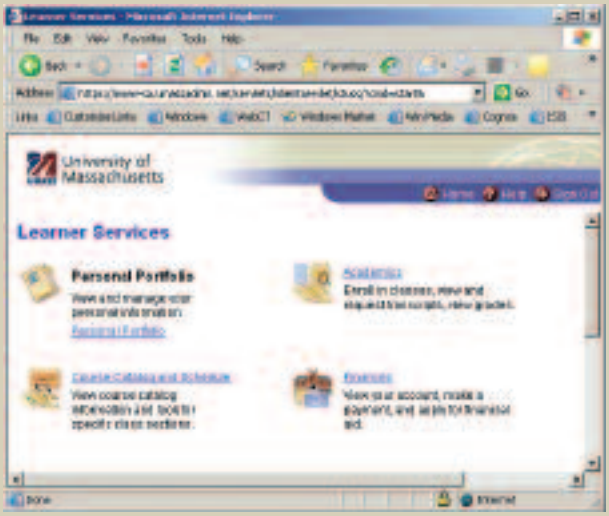
Students are welcome to drop by the Faculty and Student Support Center, located in Southwick Hall, Room 202, Monday through Thursday from 8:30am – 8:00pm and Friday from 8:30am – 5:00pm for general advising, information on associate's and bachelor's degrees and certificate programs, and/or to obtain catalogs and brochures.

- Walk-in Advising & Advising by Appointment
- Email Advising: Email us your questions at Continuing_Education@uml.edu
- Over-the-Phone Advising: Call the Faculty and Student Support Center at (978) 934-2474

Have Your Questions Answered Over the Phone or by Email!

Call the Faculty and Student Support Center at (978) 934-2474 or Email Continuing_Education@uml.edu

Need Help with ISIS?



REGISTERING FOR COURSES

Students can register for courses by using the ISIS Web-Based Self-Service system. New students can register by mail, fax, or walk-in!
To register using ISIS, visit http://isis.uml.edu
To register by fax, dial (978) 934-4076.
To register in person, visit the Registrar's Office on UML South Campus in Dugan Hall, Room 104.

ISIS (the Intercampus Student Information System)

When using ISIS, Undergraduate, Graduate, and Continuing Studies students are able to perform the following transactions:

- Search the course catalog and schedule of classes
- Register for classes as well as add, drop and swap classes
- Request official transcripts and designate the recipients of transcripts
- Pay a bill
- Accept and decline financial aid

Students also can access and print their:

- Class schedules (called a Study List in self-service)
- Grades
- Unofficial transcripts
- Advisor's name
- Account summary (billing)
- Financial aid information

Call UML's Help Desk at (978) 934-4357!

getting started

"Your advisors made me feel as though they cared as much about my future as I did... Thank You."

-- Danielle Kennedy, Continuing Studies Student

Vision Statement

Our goal is to become a leader in entrepreneurial continuing education programs for growth-oriented individuals including students, faculty and education professionals. Leading the region in delivering quality programs, on campus, onsite at companies and online, we aspire to be recognized by our peers and professional organizations for our contributions to higher education, our society and the world community.

About Continuing Studies

With over 79 years of service to adult learners, primarily in Massachusetts and New Hampshire, UMass Lowell's Division of Continuing Studies, Corporate and Distance Education attracts and serves one of the largest student populations in northern New England, providing innovative programs in areas such as Information Technology, Engineering Technology, Graphic Design, Multimedia, Website Development and Distance Learning.

The Division of Continuing Studies is one of the oldest and largest continuing education units in the state, with approximately 18,000 enrollments annually. It was founded in 1928 for the purpose of providing opportunities for growth and advancement for people working in the textile and other industries in the Lowell area. Our mission essentially has stayed the same: to provide access and opportunity for people who seek professional development or personal enrichment. In an era of changing technologies and global competition, we help people obtain and keep jobs, as well as progress in their careers. In general, we seek to foster a better-educated, more-enlightened population through life-long learning.

Continuing Studies attracts people of all ages, cultural and educational backgrounds. Our student population includes transfer students from area community colleges, people returning to school and individuals who work full time in business, government, hospitals, schools and other institutions.

REGISTERING FOR COURSES

Students can register for courses each semester by using the ISIS student information system at http://isis.uml.edu. The Division of Continuing Studies course bulletin, which lists all the courses and special programs offered each semester, is available by calling Continuing Studies at (978) 934-2474. Current semester course offerings are also available online at http://continuinged.uml.edu

FALL AND SPRING SEMESTERS

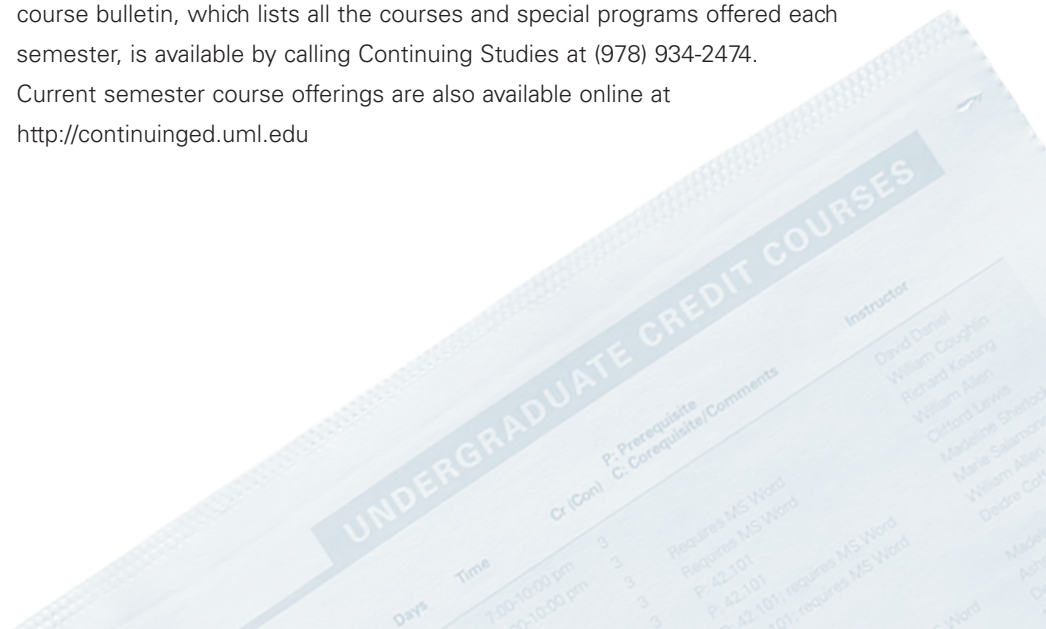
Continuing Studies Fall and Spring classes are normally scheduled one night per week from 6:00pm to 9:00pm or 7:00pm to 10:00pm on Monday, Tuesday, Wednesday and Thursday evenings as listed in the semester bulletin. Saturday classes are also offered from 9:00am-12 noon during the Fall and Spring semesters. Online courses meet on a weekly basis each semester.

WINTER INTERSESSION

A number of highly concentrated courses are offered during the month of January. You can earn college credit and accelerate your educational program by taking day or evening courses over the winter break. Day classes usually meet from 9:00am to 12:00 noon, Monday through Saturday. Evening classes usually meet from 6:00pm to 9:00pm, Monday through Friday and 1:00pm to 4:00pm on Saturday.

SUMMER SESSIONS I AND II

Graduate and undergraduate summer evening classes are scheduled two evenings a week: Monday/Wednesday or Tuesday/Thursday from 7:00pm to 10:00pm (with a few Friday evening classes) for a period of six weeks. Summer day classes are scheduled four days a week (for 3-credit classes) and five days a week (for 4-credit classes) for a period of six weeks. In addition, some technical and online courses are offered in 10-, 12- and 14-week formats. See the Summer course bulletin or website for details.



About the University

The University of Massachusetts Lowell is publicly supported by the Commonwealth of Massachusetts and offers degree programs at all levels through the doctorate. The University is located on 100 acres along the Merrimack River and presently has over 400 faculty members and a student enrollment of more than 12,000. Offering more than 80 degree programs, the University is comprised of the College of Arts and Sciences, the Francis College of Engineering, the College of Management, the School of Health and Environment, the Graduate School of Education, and the Division of Continuing Studies, Corporate and Distance Education.

On July 11, 1991 the University of Lowell became part of the University of Massachusetts system. The University of Massachusetts, with campuses at Amherst, Boston, Dartmouth, Lowell and Worcester, is governed by the Board of Trustees through the Office of the President, which is based in Boston. Leadership of the Lowell campus is vested in the Office of the Chancellor.

Lowell State College and Lowell Technological Institute were established in the last decade of the nineteenth century as single-purpose institutions charged with providing instruction in those theories and practical arts most suitable to the teaching profession and the textile industry. Lowell State College was chartered by the General Court of the Commonwealth on January 6, 1894 as a teacher-training institution and was assigned the responsibility for providing "the most thorough knowledge of the branches of learning and right mental training." In 1932 the Institution was made a four-year college and was granted the right to confer baccalaureate degrees. In 1960 the College became a multi-purpose institution by initiating non-teaching programs in the liberal arts. During the next decade and a half, the College continuously extended its mission and curriculum offerings at both the graduate and undergraduate levels and was authorized to offer degree programs in education, health professions, the liberal arts, sciences and music.

From the time of its origin in 1895 as a proprietary textile school, Lowell Technological Institute has provided educational programs of an applied and practical nature. "Science and art will be taught," the original prospectus pointed out, "with a view to industrial and commercial applications" and "for the purpose of improving any special trade or of introducing new branches of industry." The control of the school was transferred to the state in 1918, and in 1928 it was granted collegiate status. In 1953 it became a multi-purpose technological institute. Prior to its merger with Lowell State College, the Institute phased out its textile curricula. It extended its curricular offerings in engineering, technology, science, business administration and industrial management and received authorization to offer degrees through the doctorate.

The merging of Lowell State College and Lowell Technological Institute brought together two multi-purpose institutions of differing character and orientation and made possible the creation of a comprehensive university whose strengths and resources are manifestly greater than those possessed by the previous institutions.

Our Mission

The University of Massachusetts Lowell, located in the northeast section of Massachusetts, is publicly supported by the Commonwealth of Massachusetts and is one of the five campuses of the University of Massachusetts system. As an institution of higher education having legislative mandates in areas of research, teaching and public service, the University seeks to discover, integrate and transmit knowledge for the benefit of the Commonwealth and the good of society. The University of Massachusetts Lowell has the additional, specialized mission of regional economic and social development through research and education in partnership with industry. The University offers degree programs at all degree levels through the doctorate. Although undergraduate program emphasis is on professional areas in business, engineering, fine arts, health and science, the University strongly believes in the value of a liberal arts education both for its own sake and as a major component of professional preparation. Graduate program emphasis is in areas where there is a strong regional need or where the University possesses superior resources. The University also provides maximum opportunity for lifelong learning through a wide variety of credit and noncredit continuing education courses.

The University is committed to the promotion of scholarly research and creative, artistic achievement. It seeks to create new knowledge in the belief that an atmosphere of original inquiry supports both the instructional and public service goals of the University. It acknowledges its special obligation to provide quality teaching in all academic programs and continually seeks more effective methods of imparting knowledge and understanding.

Recognizing its role as a public institution, the University is committed to active involvement in community service through instruction, research, consulting, cultural events and continuing education. Finally, the University recognizes its responsibility for implementing the principles of equal opportunity and affirmative action and is committed to ensuring that all students and employees, particularly those in protected designations, are guaranteed the benefits of a just and equitable system.

"UMass Lowell's signature programs have been ranked among the finest in New England."

-- Jacqueline F. Moloney
Executive Vice Chancellor, UMass Lowell

Academic Accreditation and Professional Memberships

The University of Massachusetts Lowell is an accredited member of the New England Association of Schools and Colleges. Accreditation indicates that the University is recognized and approved by regional and national associations concerned with the quality of higher education, and it assures that study undertaken here has transfer value to other accredited institutions of higher education.

Professional programs at the baccalaureate level also are accredited by the following national associations:

ABET, Inc.
AACSB - The Association to Advance Collegiate Schools of Business International
Computing Sciences Accreditation Board
National Accrediting Agency for Clinical Laboratory Sciences
National Association of Schools of Art and Design
National Association of Schools of Music
National Council for the Accreditation of Teacher Education
National League for Nursing

The following bachelor's programs offered through the Division of Continuing Studies are accredited by the Technology Accreditation Commission of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD, 410-347-7700:

Civil Engineering Technology
Electronic Engineering Technology
Mechanical Engineering Technology

The University is also a member of the following associations of higher education:

AACSB - American Assembly of Collegiate Schools of Business
American Association of Colleges for Teacher Education
American Association of Colleges of Nursing
American Council on Education
American Society of Allied Health Professions
Association for State Colleges and Universities
Association of University Programs in Health Administration
Association for Continuing Higher Education
Association for Gerontology in Higher Education
College Entrance Examination Board
Council of Colleges of Arts and Sciences
Massachusetts Association of Colleges of Nursing
National Association of Summer Sessions
National Association of State Directors of Teacher Education and Certification
New England Board of Higher Education
North East Consortium of Colleges and Universities in Massachusetts
University Continuing Education Association

(978) 934-2474
Call our Faculty and Student Support Center with your Questions!

Academic Advising

ACADEMIC ADVISING AND COUNSELING

Students who choose to pursue a degree program are assigned a Faculty Program Coordinator. Students are encouraged to arrange an appointment with the Faculty Program Coordinator or a Faculty and Student Support Specialist upon admission into a program. The Program Coordinator will outline a program of study, taking into consideration previous academic credit. Although the Program Coordinator will assist students, each student must assume responsibility for observing the curriculum requirements and University policies.

New students, transfer students and students not enrolled in degree programs also may obtain academic advising on course selection and Continuing Studies programs and policies. Student Support Specialists are available to talk to students about courses, transfer credit, degree requirements and other matters of individual concern.

DROP-IN FACULTY AND STUDENT SUPPORT CENTER

Students are welcome to drop by the Faculty and Student Support Center, located in Southwick Hall 202, Monday through Thursday, 8:30am to 8:00pm and Friday from 8:30am to 5:00pm for general advising, information on associate's and bachelor's degrees and certificate programs, and/or to obtain catalogs and brochures. For information over the phone, call the Faculty and Student Support Center at (978) 934-2474. General Faculty and Student Support Specialists are available to assist students and to answer questions.

Appointments with Program Coordinators and Student Support Specialists

In addition to the advising conducted during the day at the Faculty and Student Support Center, late-day and evening appointments with Faculty Coordinators and Student Support Specialists are held in the Continuing Studies' Faculty and Student Support Center. Students are encouraged to call the Faculty and Student Support Center at (978) 934-2474 to schedule an appointment. Faculty evening supervisors also are available Monday through Thursday from 5:00pm to 8:00pm to answer questions and conduct status reviews and graduation interviews.

Continuing Studies' Website

Please access our website at http://continuinged.uml.edu for updated information on course schedules and descriptions, degrees, and certificate programs.

Email Advising

Students can email Continuing Studies at Continuing_Education@uml.edu for email advising.

Open Houses and Advising Information Sessions

Open Houses to inform students of current and new courses, degrees and certificate programs are held at least twice a year. Please call the Faculty and Student Support Center or look in the semester course bulletin for details.

Tutoring

In conjunction with the Centers for Learning and Academic Support Services, Continuing Studies offers tutoring in topics such as Biology/Life Science, Calculus, Chemistry and Spanish. Drop by the Tutoring Center in Southwick Hall 321, UML North.

Graduate Programs

For questions and/or information on Graduate Programs, call (978) 934-2380 or (800) 656-GRAD or visit http://www.uml.edu/grad

Applying into a Degree or Certificate Program

The Division of Continuing Studies, Corporate and Distance Education at the University of Massachusetts Lowell has an open enrollment policy: anyone may enroll in our courses, while anyone with a high school diploma or a General Education Development (GED) certificate may be admitted into a degree or certificate program.

Students are welcome to register for credit or noncredit courses offered by Continuing Studies. Students who wish to pursue a certificate, an associate's degree, or a bachelor's degree must also apply for admission to a program through the Admissions Office. To be considered for acceptance into a certificate or degree program, students must hold a high school diploma or a General Education Development (GED) certificate. Students must be admitted into a degree program to be eligible for most financial aid.

In registering for courses and/or accepting admission into the University, each student assumes responsibility for knowledge of and compliance with the definitions, regulations and procedures of the University pertaining to his or her student status as set forth in the appropriate University of Massachusetts Lowell, Division of Continuing Studies, Corporate and Distance Education publications and catalog.

Students who have questions about the interpretation or application of University academic policies should consult with a Faculty Program Coordinator or Faculty and Student Support Specialist.

Admissions into Certificate Programs

UMass Lowell offers a wide variety of credit certificate programs that allow students to obtain marketable skills within a concentrated time frame. These short-term certificate programs consist of a series of courses which, when taken together, demonstrate expertise in a specific area. For information on our certificate programs, see the Certificate Programs section in this catalog or visit our website at http://continuinged.uml.edu.

Admissions into Degree Programs

Continuing Studies offers a wide selection of degree programs through the individual colleges at University of Massachusetts Lowell. For more information on these fully accredited associate's and bachelor's degrees, see the Degree Programs section in this catalog or visit our website.

Non-Matriculation

Students who wish to register for classes but do not want to be admitted into a certificate or degree program may do so provided they have the necessary prerequisites for the course. Credit will be awarded for the successful completion of such courses. If the student chooses to become a certificate or degree candidate, the applicability of such course(s) may be subject to other policies of the University and/or to specific program requirements. Enrollment in courses does not constitute admission to a certificate or degree program. In order to matriculate, students must complete the admission process as described above.

Admission into a Graduate Certificate or Degree Program

Students interested in applying into graduate degree or certificate programs should contact Graduate Admissions at (800) 656-GRAD or (978) 934-2380 or visit http://www.uml.edu/grad. Students with Bachelor's Degrees from accredited institutions are eligible to enroll as non-degree students for a total of 12 credits prior to matriculating into formal graduate degree programs. Students must formally apply to graduate certificate programs before enrolling in graduate courses intended for specific certificate programs.

See page 39 for more information on our degree programs!

See page 93 for more information on our certificate programs!

Registering for Courses

For tuition information and complete information on how to mail-in, phone-in or fax-in your registration for on-campus, off-campus and online courses, visit our website at http://continuinged.uml.edu or check the semester course bulletin. Existing students also have self-service access through the ISIS student information system at http://isis.uml.edu.

Q Do I have to enroll in a degree or certificate to take CSCDE classes?

A Anyone can register for a course, provided they meet that course's specific prerequisites. Students who wish to pursue a degree or certificate program must apply for admission to a program through Continuing Studies.

International Students

International students registering for classes or enrolling in programs must provide proof of Visa status. Students with F-1 or J-1 status must provide a copy of their I-20 or DS-2019 form. These students will be allowed to count, per semester, only one distance learning (online) course, or 3 credits, toward the full-time undergraduate course load (12 hours) or the full-time graduate course load (9 hours). The ultimate responsibility to know and follow the USCIS rules rests upon the students themselves. Students holding B-1, B-2 or F-2 Visas may not register for any academic classes. The University of Massachusetts Lowell does not issue I-20 Forms for any Continuing Studies programs. For more information, contact Anne Dean, International Student Advisor, at Anne_Dean@uml.edu.

REGISTRATION AND FINANCIAL INFORMATION

Tuition and Fee Information

Tuition is priced on the basis of credit hour unless contact hour is different. Tuition is then based on the listed contact hour. Course credit/contact hour information is provided in the Continuing Studies Course Bulletin each semester. Tuition, fees and refund policies are subject to change. The current tuition and fee information is listed in each semester bulletin, and on the Continuing Studies website at http://continuinged.uml.edu and at http://www.uml.edu/admin/ar.

Tuition Refund Policy for Credit Courses

Students who withdraw from the University or drop all of their courses during the add/drop period will receive a 100% adjustment to tuition and fees for the semester except for the following:

1) The Continuing Studies $30.00 registration fee.
2) Students who are suspended or expelled for disciplinary reasons will forfeit all rights to a tuition and fee adjustment.
3) Any book voucher monies advanced to students and used at the bookstore. Students should contact Barnes and Noble (978) 934-2623 for the bookstore refund policy on books and materials purchased directly from them.
4) Residence hall charges and meal plan charges follow a different refund schedule. Students should contact the Residence Life Office at (978) 934-5115 for further assistance.

Please note: There are no adjustments to tuition and fee charges if students withdraw or drop classes after the add/drop period of the academic semester.

Student records will be cleared and appropriate refunds will be awarded, only after outstanding University bills (library fines, parking fines, etc.) are paid and all University-owned property is returned. If debts remain unpaid, students' academic permanent records will not be released and students will not be readmitted to the University.

Note: Fees are not refunded unless Continuing Studies is responsible for cancellations. Students withdrawing from any class can do so using ISIS or by notifying the Registrar's Office.

Visit our website for up-to-date tuition and registration information at http://continuinged.uml.edu

Health Insurance

State law requires that all matriculating full-time and part-time undergraduate students regardless of the number of credits carried, and all matriculating graduate students enrolled in nine or more credit hours be charged for the University health insurance plan. Upon evidence of comparable coverage, this fee can be waived by submitting a health insurance selection form to the Accounts Receivable Office by the specified deadline.

Downloadable forms to enroll in or to waive out of the University's health insurance plan are available on the Accounts Receivable website. *Please note all students are enrolled in the University health insurance unless they waive enrollment.*

International Students: As authorized under the insurance laws for higher education students in Massachusetts beginning in Fall 2002, the University of Massachusetts Lowell requires that all international students enroll in the University's Student Health Insurance Plan. The only exception to this requirement is for international students enrolled in an Embassy plan. Waivers for students enrolled in an Embassy plan will be permitted only after the student has submitted official documentation confirming this coverage and that the coverage provided meets all state-mandated requirements.

All students who withdraw or drop all of their classes within the first 30 days (calendar days) of the academic semester are not allowed to be enrolled in the University health insurance plan.

Refund Policy for Students on Financial Aid

All students who are financial aid recipients are reminded that their aid is also reduced and the financial aid adjustment schedule may be different than what has been stated above as required by Federal law. Students are strongly encouraged to discuss these issues with a financial aid counselor prior to withdrawing. Please note that money will be returned to the applicable financial aid assistance programs before any money is disbursed to the student. For information regarding Financial Aid, please contact the Financial Aid Office at (978) 934-4220. For information on Financial Aid, TERI Loans and Scholarships, visit the Financial Aid website or see our Financial Aid Information Sheet.

International Students

The International Student Office will notify the Bureau of Citizenship and Immigration Services (BCIS) of all international students who either withdraw or drop below full-time status during the academic semester.

Graduate Teaching and/or Research Assistants

Graduate Teaching Assistant and/or Graduate Research Assistant contracts will be voided if students drop below full-time status.

Final Clearance

Prior to having students' records cleared and the issuing of any appropriate refund, outstanding University bills (library fines, parking fines, etc.) must be paid and all University-owned property must be returned (athletic, lab, library books, etc.). If debts remain unpaid, students' academic permanent records will not be released and students will not be readmitted until they are paid.

Tuition Refund Policy for Students Receiving Title IV Financial Aid and Enrolled in a Degree or Specifically Designed Certificate Program

Refunds for Title IV financial aid recipients will be processed according to federal guidelines and institutional policy. Please call the Financial Aid Office at (978) 934-4220 if you have any questions.

Payment of Bills

Payments may be made by cash, check, money order, MasterCard, Visa and Discover. Mail payments (made payable to University of Massachusetts Lowell) to:
University of Massachusetts Lowell
Attn: Treasury Office
883 Broadway Street, Room 106
Lowell, MA 01854-5109

Payments may also be made in person at the cashier's window, Room 106, Dugan Hall, UML South. Please note, a cash payment cannot be accepted after 4:00pm. To pay by credit card, call (978) 934-3593.

Students may also make a payment or view accounts online by logging on to the Student Information System (ISIS).

Overdue Accounts

Students will be permitted to attend class and to utilize facilities only after they have cleared all their financial obligations to the University. In addition, student transcripts and diplomas will not be released unless all debts have been paid.

All students are advised that the University uses the services of collection agencies authorized under the Commonwealth's Master Service Agreement. Students with a prior semester balance who are not enrolled in the current semester and are referred to a collection agency are held liable for all associated collection costs, which may be substantial.

Commonwealth Employees' Tuition Remission

Provisions of particular collective bargaining agreements allow employees of the Commonwealth of Massachusetts, and in some cases their dependents, to take Continuing Studies courses at a 50% reduction in tuition. Students who may be eligible should consult their Personnel Director for guidelines. Currently valid Certificates of Eligibility, complete with all necessary signatures of approval, must be presented at the time of registration for classes. Retroactive waivers will not be accepted.

Senior Citizen Waivers

Senior citizens (60 years or older) who are Massachusetts residents may attend on-campus classes in Continuing Studies credit programs tuition-free, provided that there is a sufficient number of tuition-paying students enrolled to bear the cost of instruction and provided there is space available. Please note that waivers are not retroactive and do not cover registration fees and other fees. Proof of Massachusetts residency and birth date must be provided annually at the time of registration. There are no waivers available for online and off-campus courses. For additional information, contact Accounts Receivable.

Veteran's Benefits

Veterans must be matriculated in an undergraduate degree or certificate program and have all appropriate paperwork on file in the Registrar's Office, Dugan Hall 104, UML South, 883 Broadway Street, Lowell, MA including a DD214 and an Admission Application form in order to receive VA benefits. Tuition waivers are available to veterans who are legal residents of Massachusetts for more than 12 consecutive months, and Proof of Residency must be updated annually. These waivers for legal Massachusetts residents are not retroactive and do not cover registration fees and other fees. Veterans requesting benefits must check the appropriate line on the registration form. Veterans should use the mail-in or walk-in options when registering and should provide all necessary documentation. For additional information, call Linda Morabito at (978) 934-2461.

Veterans' waivers are available for on-campus courses provided there is a sufficient number of tuition-paying students enrolled to bear the cost of instruction and provided there is space available. Due to the high cost of online and off-campus courses, there are no waivers available for these courses. There are no waivers for Directed Studies, Practicums and Internships. Merit and Need-Based Assistance Grants for online courses may be available to veterans who are presently enrolled in degree and certificate programs and who are making satisfactory academic progress towards their degrees or certificates.

Directed Studies

Directed Studies and Practicums are considered Special Programs, and, as such, tuition remission and certificate of eligibility cannot be accepted.

Third-Party Payment

All students using company direct payment, military plans, state tuition waivers or veterans' waivers must mail the appropriate authorization forms to UMass Lowell, Accounts Receivable Office, 883 Broadway Street, Room 101, Lowell, MA 01854-5110. No tuition refund is awarded for late submission of eligibility form. Students receiving company reimbursement must prepay their own tuition. The University does not honor company reimbursement contingent upon grades. For additional information, call (978) 934-2446.

Registering for Graduate Courses through Continuing Studies

Students who hold a bachelor's degree from an accredited institution may register for graduate-level online, off-campus and summer courses through Continuing Studies. Students with Bachelor's Degrees from accredited institutions are eligible to enroll as non-degree students for a maximum total of 12 credits (depending on the program) prior to matriculating into formal graduate degree programs. Students must formally apply to graduate certificate programs before enrolling in graduate courses intended for specific certificate programs. For more information on registering for a graduate-level course or applying into a graduate program, visit http://www.uml.edu/grad or call (800) 656-GRAD.

Checklist for New Students or Non-Degree Graduate Students

A Step-by-Step Guide to Registering for Courses

- SELECT COURSE(S) FROM OUR PRINTED COURSE BULLETIN, WEBSITE (http://continuinged.uml.edu), OR ISIS WEBSITE (http://isis.uml.edu)

  ☆ Many courses have prerequisites. The prerequisites are intended to help you succeed in the course. You are expected to comply with them. Some courses have restrictions that limit registration. If you plan to select courses requiring consent of instructor or departmental approval, contact the department offering the course to obtain a permission number before registering.

  ☆ Students are welcome to drop by the Faculty and Student Support Center, located in Southwick Hall, Room 202, Monday through Thursday from 8:30am to 8:00pm and on Friday from 8:30am to 5:00pm or call to schedule an evening appointment for general advising, to obtain information on associate's and bachelor's degrees and certificate programs, and/or to obtain catalogs and brochures. Call (978) 934-2474 for information or email Continuing_Education@uml.edu.

- ON-CAMPUS AND OFF-CAMPUS STUDENTS must do the following prior to beginning a course:
  ☆ Send in the Registration Form for New Continuing Studies Students.
  This can be faxed, mailed or delivered in person to Dugan 104, 883 Broadway St. Do not provide payment at this time. You will receive a bill in the mail.
  ☆ Get your ISIS User ID and Password at http://isis.uml.edu.
  You should wait 48 hours after submitting your registration form to do this step to allow the registrar's office time to process your registration. ISIS will allow you to view and make changes to your course schedule, view your grades, access transcripts, etc.
  ☆ Learn how to access your UMass Lowell email account at http://email.uml.edu.
  You should wait 3-5 days after submitting your registration to complete this step. The University will automatically assign you a student.uml.edu email account upon registration and this is the address where all official University communication will be sent.
  ☆ Get your textbooks.
  There are two bookstores on campus, one in the Dining Hall on South and one in Falmouth Hall on North. You can visit the bookstore website at http://umlowell.bkstore.com.

- ONLINE STUDENTS must do the following in order to access a course:
  ☆ Send in the Registration Form for New Continuing Studies Students.
  This can be faxed, mailed or delivered in person to Dugan 104, 883 Broadway St. Do not provide payment at this time. You will receive a bill in the mail.
  ☆ Get your ISIS User ID and Password at http://isis.uml.edu.
  You should wait 48 hours after submitting your registration form to do this step to allow the registrar's office time to process your registration. ISIS will allow you to view and make changes to your course schedule, view your grades, access transcripts, etc.
  ☆ Get your online course username and password at http://continuinged.uml.edu/online.
  You must wait 1-2 business days after registration before completing this step. Click on the "Get Your Online Course Username & Password" link to do this.
  ☆ Learn how to access your UMass Lowell email account at http://email.uml.edu.
  You should wait 3-5 days after submitting your registration to complete this step. The University will automatically assign you a student.uml.edu email account upon registration and this is the address where all official University communication will be sent.
  ☆ Get your textbooks.
  You can order books via our online bookstore at http://umlowell.bkstore.com. Additionally, the on-campus bookstores carry a limited supply of books for online courses.
  ☆ Log into your online course on the first day of classes at http://continuinged.uml.edu/online.
  Click on the "Online Student Login" to do this. You will need the username and password that you created in step 3 above.

- QUESTIONS? Please Call Us - We're Here to Help!

ISIS account or email questions:	Call the ISIS Help Desk at (978) 934-4357 (HELP).
Online Course questions:	Call Continuing Studies Online Course Support at (978) 934-2467 / (800) 480-3190.
Registration questions:	Call the Registrar's Office at (978) 934-2550.
Other general questions:	Call the Continuing Studies Faculty and Student Support Center at (978) 934-2474.

Financial Aid

FINANCIAL AID, SCHOLARSHIPS AND GRANTS

The University of Massachusetts Lowell is committed to helping qualified students reach their educational goals by providing a variety of financial aid programs and resources. Financial aid consists of scholarships and grants (the awarding of money for which no repayment is required), self-help in the form of loans (money lent to a student to be paid back during a specified period, usually following the termination of University studies), and employment or University-sponsored work for all or part of an academic year. Financial aid awards are made on a yearly basis and are dependent upon the availability of funding from specific sources, proven financial need and the criteria of specific financial aid sources.

Upon request, selected candidates must submit copies of appropriate tax documentation and W-2s to the Student Financial Service Center.

Financial Aid Terms and Conditions

To receive financial aid from the various student aid programs, a student must:

- Have financial need, except for the unsubsidized loan program and some meritorious aid. Need is defined as the cost of attendance minus the expected family contribution derived from filing the Free Application for Federal Student Aid (FAFSA) yearly. You may apply online at the U.S. Department of Education's FAFSA website at http://www.fafsa.ed.gov. UMass Lowell's Title IV school code is 002161.
- Have a high school diploma or a General Education Development (GED) certificate, pass a test approved by the U.S. Department of Education, meet other standards the Commonwealth of Massachusetts establishes that are approved by the U.S. Department of Education, or complete a high school education in a home school setting that is treated as a home school or private school under state law.
- Be a matriculated student enrolled in a degree-granting or approved certificate program.
- Be a U.S. citizen or have permanent VISA status.
- Have a valid Social Security number.
- Make satisfactory academic progress.
- Not be in default or owe money back on a federal student grant.
- Be registered for Selective Service ("the Draft") if you are a male student between the ages of 18-25.

In order for Financial Aid to determine a student's financial aid eligibility, the Financial Aid Office must have the student's processed FAFSA form on file and confirmation of his/her acceptance into a degree/certificate program with the Division of Continuing Studies. The student will be notified of his/her financial aid via the Financial Aid Award Notification Letter. The student's award is based on half-time enrollment (6-8 credits).

Students can register, view their financial aid package or make a payment through the ISIS web-based self-service system (http://isis.uml.edu). From there students can accept/decline awards, view estimated cost of attendance and check loan status. Students are advised to periodically review their award summary for adjustments due to enrollment, housing, residency or other changes that may affect their financial aid package, as well as check their personal portfolio "To Do List" to determine if documents are needed to complete their financial aid file.

Please be advised that students need to maintain an enrollment status of at least 6 credits during the Fall and Spring semesters to receive most types of financial assistance including student loans. Financial aid is not available during the summer sessions.

Scholarships, TERI loans and financial aid are available for full-time Continuing Studies students!

For more information visit http://www.uml.edu/financialaid

If you have additional questions, contact the Financial Aid Office at (978) 934-4220.

TYPES OF FINANCIAL AID

Federal Pell Grant
An undergraduate grant from the Federal government that you do not need to repay.

Federal Supplemental Educational Opportunity Grant (FSEOG)
A Federal grant awarded by the University to students with exceptional need. A FSEOG does not need to be repaid.

Massgrant
A grant based on financial need that is awarded by the Massachusetts Office of Student Financial Assistance to eligible state residents. To be considered, full-time students must have filed a FAFSA with the Federal Student Aid Programs by May 1st. The state will notify students directly regarding eligibility. The amount of the award is subject to verification requirements by the University of Massachusetts Lowell.

Mass Part-Time Grant
A state grant based on financial need awarded to eligible state students who meet the eligibility requirements of the Massachusetts Office of Student Financial Assistance. To be considered, students must be enrolled in at least 6 credits but fewer than 12 credits per semester and have filed a FAFSA with Federal Student Aid Programs.

Employment Opportunities
The Federal College Work Study and the UMass Lowell Campus Work Programs provide part-time, on-campus employment to eligible students who need the income to help defray the cost of their education. The Job Locator Program is an employment service provided by the Student Employment Office to assist students in finding off-campus employment. Various companies in the greater Lowell area post positions.

William D. Ford Federal Direct Loan Programs
The Federal government funds these loan programs. There is no separate application for this loan but first-time borrowers at the University are required to complete and sign a Master Promissory Note before funds are credited to the student's University account. Eligibility for a Federal Direct Subsidized Loan or a Federal Direct Unsubsidized Loan is determined from the information provided on the FAFSA. A Federal Direct Subsidized loan is awarded on the basis of financial need. A student will not be charged any interest before repayment begins or during authorized periods of deferment. The federal government subsidizes the interest during these periods. A Federal Direct Unsubsidized loan is not awarded on the basis of financial need. A student will be charged interest from the time the loan is disbursed until it is paid in full.

Federal Perkins Loan
A 5% fixed interest Federal loan administered by the University. Repayment begins 9 months after a borrower ceases to be a student.

WITHDRAWAL/RETURN OF TITLE IV STUDENT FINANCIAL ASSISTANCE (SFA)

Undergraduate Students
Undergraduate students withdrawing from the University are required to 1) discharge all financial obligations to the University, 2) return all University property, and 3) file a written notification of withdrawal with the Registrar's Office.

Guidelines for SFA Withdrawal/Return
The Federal law now specifies how the University must determine the amount of SFA program assistance that a student earns if he/she withdraws. The new law requires that, when a student withdraws during a payment period or period of enrollment (the University can define these periods), the amount of SFA program assistance earned up to that point is determined by a specific formula that is prorated. If the student received (or the University received on the student's behalf) less assistance than the amount earned, the student will be able to receive those additional funds. If the student received more assistance than earned, the excess funds must be returned.

The amount of assistance that a student earned is determined on a pro-rata basis. That is, if you completed 30 percent of the payment period or period of enrollment, you earn 30 percent of the assistance you were originally scheduled to receive. Once you have completed more than 60 percent of the payment period or period of enrollment, you earn all of your assistance.

If you received excess funds that must be returned, the University will return a portion of the excess equal to the lesser of

- your institutional charges multiplied by the unearned percentage of your funds, or
- the entire amount of the excess funds.

If the University is not required to return all of the excess funds, you must return the remaining amount. Any loan funds that you must return, you (or your parent for a PLUS Loan) repay in accordance with the terms of the promissory note. That is, you make scheduled payments to the holder of the loan over a period of time.

If you are responsible for returning grant funds, you do not have to return the full amount. The law provides that you are not required to return 50% of the grant assistance that you receive that it is your responsibility to repay. Any amount that you do have to return is a grant overpayment, and you must make arrangements with your school or the Department of Education to return the funds.

Scholarship Information

Continuing Studies Dean's Scholarship

The Continuing Studies Dean's Scholarship awards are for $1,000 and may be continued on a semester basis, conditional upon satisfactory academic performance. The maximum length of the award is 4 semesters. See our website at http://continuinged.uml.edu for details.

Millie McGuire Technical Writing Scholarship Fund

The Millie McGuire Scholarship is awarded in May each year to a student enrolled in the Technical Writing Certificate Program at UMass Lowell. The scholarship is managed by the UMass Lowell Director of Giving. The recipient is selected by the NNE Scholarship committee in conjunction with UMass Lowell. For additional information please visit http://www.stc-nne.org.

Hoff Scholarships

Merit Scholarships are available to Continuing Studies, Corporate and Distance Education undergraduate degree students who are U.S. citizens (or eligible non-citizens) and permanent residents of Massachusetts. Applicants must achieve sophomore status by June to be eligible.

The Hoff Scholarship Award is for up to $2,000 for the academic year ($1,000 each semester). Applicants must be enrolled in a minimum of 3 courses (9 credits) per semester for the duration of the scholarship. The scholarship is for one year only and the recipient will have to re-apply to be considered for the next year.

Financial support for the program is provided by the Charles J. Hoff Foundation, which funds up to five Continuing Studies, Corporate and Distance Education scholarships each year. Contact the Faculty and Student Support Center at (978) 934-2474 for details or download the application form from our website at http://continuinged.uml.edu.

Veterans Online and Off-Campus Scholarships

Scholarships will be awarded to Veterans who are enrolled in a degree or certificate program for $300 each. These scholarships can be used one time only and for one course only. Applications will be evaluated by the CSCDE Scholarship Committee and will be judged by merit and thoughtfulness in written response. Download the application form from our website.

Leo F. King Scholarship

The friends of the Dean Leo F. King Scholarship Committee are pleased to announce the availability of an annual scholarship award for adult learners returning to school. Contact the Faculty and Student Support Center at (978) 934-2474 for details.

ASL Adult Education Foundation Scholarships

Alpha Sigma Lambda Adult Education Foundation Scholarships are available for Continuing Studies, Corporate and Distance Education students who are matriculated in associate's or bachelor's degree programs and who demonstrate academic strength and leadership. Submissions are due by early April. For more information, visit http://www.alphasigmalambda.org/foundation/scholarship.php.

Student Services & Access to University Facilities

National Honor Society

The Gamma Delta Chapter of Alpha Sigma Lambda is a national honor society for Continuing Studies students. The aim of Alpha Sigma Lambda is to recognize adult students who achieve academic excellence in their course work while performing the many responsibilities associated with their families and careers. Eligibility for membership requires that students rank in the top 10 percent of all students who meet certain academic requirements. Selections for membership are made during the Spring, and students who are invited to become members are inducted into the Society in April.

Office of Career Services

The University Career Services staff assists students to develop the skills and understanding needed to make informed choices during their career life. Career development workshop topics include: resume creation, cover letter writing, interview skills and job search strategies. Annually, several specialized job fairs and career events are organized and hosted on-campus. For students enrolled in a degree or certificate program, individual career counseling appointments are available to assist students with specific concerns.

Access to electronic and printed resources is provided for job market research and skills development. Informative and helpful videos on career search skills and industry profiles are available for viewing in-office. Students are able to use several in-office computers with Internet access. Links to recruiting employers, job search engines, online postings specifically for UMass Lowell students and helpful job search skills articles are all easily found on the Career Services website: http://career.uml.edu. Some portions of the website are available to everyone who visits the site and others are password protected and require the establishment of a free online account. These accounts are limited to UMass Lowell students and alumni.

Office hours are 8:30am to 5:00pm, Monday through Friday.

Services for Learning and Physically Disabled Students

The University is committed to serving all students with disabilities as defined by the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. A qualified person with a disability means: an individual with a disability who, with or without reasonable modifications to rules, policies or practices, the removal of architectural, communication or transportation barriers, or the provision of auxiliary aids and services, meets the essential eligibility requirements for the receipt of services or the participation in programs or activities provided by a public entity.

The University and its programs and activities are becoming increasingly more accessible to academically qualified students who are physically and/or learning disabled. Although some architectural barriers still remain, disabled persons can traverse the campus with a minimum of difficulty. University libraries, the student unions, several residence halls and more recently constructed classroom buildings are accessible to students in wheel chairs. Early registration, preferential scheduling, readers, notetakers, interpreters, alternative testing procedures and special parking arrangements are some of the accommodations available to disabled students. For further information, contact Dr. Chandrika Sharma, Ed.D in the Office of Disability Services, O'Leary 240, (978) 934-4574 or see the website at www.uml.edu/student-services/disability.

Special Events for Continuing Studies Students!

- **Open Houses and Student Orientation Nights**
- **Career Open Houses and Job Fairs**
- **Continuing Studies Honor Students Recognition Ceremony**

Call the Faculty and Student Support Center at (978) 934-2474 for details!

State-of-the-Art Computer Laboratories

Each year, Continuing Studies re-invests a large portion of its proceeds into state-of-the-art computer labs. This major investment in both hardware and software has contributed greatly to the extensive facilities the University makes available to both day and evening students. In addition to several dedicated classroom labs, a number of drop-in labs are available, providing students with access to a wide array of software packages and Internet connection.

University Libraries

The University libraries are proud to provide a wide range of library services to the entire UMass Lowell community of students, faculty and staff. As a vital part of the UMass Lowell community, all Continuing Studies, Corporate and Distance Education students including distance learners are encouraged to take advantage of any and all library services offered. The University library system consists of facilities at three locations as well as an extensive electronic library. The O'Leary Library, located on UMass Lowell South, concentrates on resources in social sciences, health, education, music and the humanities. Lydon Library, situated on UMass Lowell North, focuses on the sciences, technology and management. The Center for Lowell History at the Mogan Center in downtown Lowell is home to many unique items including a variety of manuscripts, books, photographs and oral history materials on the Greater Lowell region, the 19th century textile industry, immigrants, the Boston and Maine Railroad and other special collections.

Present library holdings include over 357,000 volumes; 700 current periodical subscriptions; 1.6 million microform items; over 5,000 videos; 8,600 music scores; and 5,500 sound recordings. More than 250 Internet accessible databases, many offering full text, are available from the electronic library at http://library.uml.edu. This includes over 11,000 electronic journals, plus law cases, business, statistical and financial data, government documents, and comprehensive coverage of current material in all fields. The library catalog and all databases are available at any terminal in the libraries or throughout the University via the campus network. They may also be accessed by using a free dial-up account provided by the University or by using any commercial Internet service provider.

The University libraries participate with the Boston Library Consortium Virtual Catalog Project and the Massachusetts Statewide Virtual Catalog. These are library services that allow users to search the catalogs at other libraries for books and request items not owned by UMass Lowell libraries. The libraries also provide an interlibrary loan service that may be utilized to obtain books or journal articles. Journal articles can be delivered electronically to an e-mail address or mounted on the web for a short time, eliminating the need to come into the library to retrieve paper copies.

Librarians offer reference assistance to all patrons in person, by telephone – (978) 934-3213 [North] or (978) 934-4554 [South] – or through Live Help, the library's innovative online chat service. Faculty can arrange for general library tours as well as specialized library instruction for individuals and classes. Media services at both O'Leary and Lydon include individual, class and large-group viewing facilities for video and multimedia programs, consultation on individual media projects, and production of visual, audio and multimedia materials.

If students have any questions about the libraries or library services, please don't hesitate to visit the website at http://library.uml.edu, or call (978) 934-4550 for the O'Leary Library or (978) 934-3205 for the Lydon Library. Professional reference librarians are available online and by telephone.

University Bookstores

The University bookstores are located in the UML South Dining Hall and in the lower level of Falmouth Hall on UML North. Please check with the Division of Continuing Studies or the semester bulletin for times of operation.

UMass Bookstore - UML North: (978) 934-2623
UMass Bookstore - UML South: (978) 934-6908

Textbooks

The bookstores carry all textbooks and supplies needed for classes. If your class is being held on UML North, textbooks for your class should be available at the UML North Bookstore; if your class is being held on the UML South, textbooks for your class should be available at the UML South Bookstore.

Students taking online courses can order books through the UMass Lowell bookstore at http://umlowell.bkstore.com

The bookstores also provide a wide range of imprinted clothing and backpacks, greeting cards, calculators, etc. Purchases at the bookstores can be made by cash, check or MasterCard/Visa/Discover.

Parking Information / Access Services Office

New parking stickers are required for all Continuing Studies students. The parking registration form and current information on parking is available at http://parking.uml.edu.

This sticker entitles students to park after 5:30pm in a University parking lot except Cumnock Hall. Students are encouraged to park in the numerous parking lots on UML North and UML South. Students and faculty should not compromise public safety by blocking access of fire lanes, ambulance and other emergency vehicles. Students and faculty should not park in handicap spaces unless they display a handicap sticker. Student and faculty cars will be towed and/or ticketed for violations. In addition, the Lowell Police will tow student and faculty cars if parked in "Residential Parking" areas.

Safety Shuttle Service

The University now operates a motorized Student Escort Service seven nights a week from 6:00pm to 1:00am. Call (978) 934-2222 for a ride anywhere on campus - from the parking lots, to the library, the residence hall, or the gym. It is a service designed for the entire University community – day and evening students, staff and faculty.

Shuttle Bus/Inter-Campus Transportation

Shuttle buses run continuously between the campuses from 7:15am through 11:00pm on class days. Detailed schedules are posted around campus and are available at the Office of University Life (UML North) and the Office of Student Activities and Commuter Services (UML South).

policies & procedures

Grading Information

Student Rights and Responsibilities

University Policies

policies & procedures

Grading Information

The following qualitative letter grades are employed by faculty members to characterize the quality of a student's work in a course: A (4.0), A- (3.7), B+ (3.3), B (3.0), B- (2.7), C+ (2.3), C (2.0), C- (1.7), D+ (1.3), D (1.0), and F (0). These grades will compute into a student's grade point average.

A Designates that the work done by the student is superior and is of the highest honors quality.

A- Designates that the work done by the student is less than superior but is of high honors quality.

B+ Designates that the work done by the student is of high quality.

B Designates that the work done by the student is of basic honors quality.

B- Designates that the work done by the student is below honors quality.

C+ Designates that the work done by the student is above satisfactory quality.

C Indicates that the work done is of satisfactory quality.

C- Indicates that the work done by the student is less than satisfactory and below graduation standards but is better than the minimum requirement for passing a course.

D+ Indicates that the work done by the student is less than satisfactory and below graduation standards but is above minimum passing quality.

D Indicates work which meets the minimum passing quality.

F Designates course failure.

In addition to the above letter grades, the following symbols are also used to designate special enrollment provisions or course status and do not affect the student's academic average.

P Designates completion with credit of an unrestricted elective which was taken on a pass/no credit basis.

NC Indicates failure of an unrestricted elective which was taken on a pass/no credit basis.

S Designates satisfactory completion of a practicum experience course with a grade of "C" or better.

U Designates unsatisfactory performance in a practicum experience course with a final course grade of less than "C".

INC Indicates a course that has not been completed.

AU Designates that the student has registered for a course on an audit basis and has maintained an attendance record throughout the semester, which is sufficient to warrant an official recognition of course attendance. Credit may not be earned in courses that have been audited except by re-enrollment in and completion of the course with a passing grade. Students who have audited a course subsequently may not earn credit in the same course through tests of the College Level Examination Program or through other authorized examination procedures for course challenge. The fee for audit is full tuition.

W Designates official withdrawal from a course within the established deadline.

X Designates withdrawal after the established deadline for administratively approved reasons of an emergency or medical nature.

Y Designates administrative withdrawal for other than academic reasons.

Pass/No Credit Course Registration

Students may elect to register on a pass/no credit basis for a maximum of four unrestricted elective courses. A student may not change his or her enrollment status from letter grade to pass/no credit or from pass/no credit to letter grade after the established deadline for adding a course. A pass/no credit course cannot be presented in fulfillment of University General Education requirements, major programs, minor programs or specifically designated courses (collateral requirements) of an established curriculum. A grade of "P" indicates that a student's performance merits an evaluation of "D" or better. "NC" indicates that a course has been failed but that such failure is without prejudice to the student's cumulative average. Although appropriate credits are granted to students when grades of "P" have been assigned, these credits are not qualitatively weighted and, hence, do not affect a student's academic average.

Satisfactory-Unsatisfactory Courses Registration

Certain courses (e.g., practicum experiences, advanced seminars and directed studies) may be graded as satisfactory or unsatisfactory. A grade of "S" indicates that a student's performance merits an evaluation of "C" or better. "U" indicates a course evaluation of less than "C". Although appropriate credits are granted to students when grades of "S" have been assigned, these credits are not qualitatively weighted and hence do not affect a student's academic average. A grade of "U" indicates that attempted course credits have not been granted and is awarded without prejudice to a student's cumulative average.

Administrative Dismissal from the University

A student may be administratively dismissed from the University through cancellation of registration for due cause, through suspension or expulsion for academic dishonesty, and through disciplinary procedures for violations of good conduct.

Administrative dismissal may be invoked when a student fails to comply, after due notice, with an administrative regulation of the University. Official notification of an administrative dismissal is noted on the permanent record (transcript) by the symbol "Y", which is entered for each course that has been carried by the dismissed student. Reinstatement of a student who has been administratively dismissed may be made only by application for readmission with Continuing Studies and only when the condition that has necessitated administrative dismissal can be ameliorated to the satisfaction of Continuing Studies. Examples of some conditions that may justify administrative dismissal are as follows:

a. Forgery or fraudulent use of University records, documents or forms; unauthorized entry into University records (including computerized records);

b. Non-payment of tuition, student fees, library fines, overdue University loans and other official University fiscal obligations;

c. Failure to comply with a duly authorized administrative order relating to the safety of persons or the protection of University property;

d. Failure to withdraw from the University after certification of a physical health or mental health condition of a hazardous nature.

Withdrawal

"W" notation is not an academic grade but a symbol designating official withdrawal from a course within the established deadline of the tenth class meeting of a semester. Official withdrawal is accomplished through ISIS (http://isis.uml.edu).

A notation of "W" cannot be given for unofficial withdrawal from a course or for unofficial withdrawal from the University. Accordingly, a student who registers for a course and is carried on an official class roster after the tenth class meeting of a semester (or its equivalent) must be graded in terms of the completion of the instructor's total course requirements even though the student did not attend any class meeting or unofficially left the University before the tenth meeting of the semester. A student who wishes to withdraw from a course after the deadline must submit a petition to the Registrar's Office. An "X" will be given only when it can be demonstrated that extended illness or a critical personal emergency of an extended nature prevented that student from complying with official withdrawal procedures. Students receiving benefits from the Veterans Administration are not eligible for retroactive withdrawal from courses.

Withdrawal from the University

A student who must discontinue attendance at the University must inform the Registrar's Office immediately and in writing.

Alternative to Withdrawal

Students are strongly encouraged to consider and investigate alternatives to withdrawing. Many options and resources are available to assist you in making an informed decision. Please contact the Dean of Students office at (978) 934-2100 for names and locations of staff who might be useful to you.

Refund Schedule for Tuition and Fees

Students that withdraw or drop all of their courses during the add/drop period will have a 100% adjustment to tuition and fees associated with that semester except for the following:

1) Residence hall charges and meal plan charges follow a different refund schedule. Please contact the Residence Life Office at (978) 934-5115 for further assistance.
2) Students are responsible for any book voucher monies advanced to them and used at the bookstore. The bookstore has its own refund policy on books and materials purchased directly from them. Please contact Barnes and Nobles at (978) 934-2623 for further assistance.
3) The Continuing Studies $30.00 registration fee.
4) Students who are suspended or expelled for disciplinary reasons will forfeit all right to a tuition and fee adjustment.

Procedure

A student must bring a completed withdrawal form to the Registrar's Office, 883 Broadway Street, Dugan Hall, Room 104, South Campus, Lowell, MA. The official withdrawal form can also be found at www.uml.edu/admin/registrar/forms.htm. Failure to attend class does not constitute a withdrawal. PLEASE NOTE: There is no adjustment to the tuition and fee charges if you withdraw or drop a class after the add/drop period of the academic semester.

Additional Considerations

Health Insurance

All students that withdraw or drop all of their classes within the first 30 days (calendar days) of the academic semester are not allowed to be enrolled in the University student health insurance plan. Please see page 10 for additional information.

Financial Aid

All students that are financial aid recipients are reminded that their aid is also reduced and the financial aid adjustment schedule may be different than what has been stated above as required by federal law. Students are strongly encouraged to meet with their financial aid counselor prior to withdrawing. Please note that monies will be returned to the applicable financial aid assistance programs before any monies are disbursed to the student.

International Students:
The International Student Office at the University of Massachusetts Lowell will notify the Bureau of Citizenship and Immigration Services (BCIS) of all international students who either withdraw or drop their course load below full-time status during a given academic semester.

PLEASE NOTE: Graduate Teaching Assistant and Graduate Research Assistant contracts will be voided if the student drops below full-time status.

Final Clearance

Prior to having your records cleared and the issuing of any appropriate refund, outstanding University bills must be paid (library fines, parking fines, etc.) and all University owned property must be returned (athletic, lab, library books, etc.). If any debts remain unpaid your academic permanent record will not be released and you will not be readmitted until they are paid.

Incomplete Courses

The letter symbol "INC" (incomplete) is a temporary notation that is assigned for incomplete work in courses when the records of students justify the expectation that they will obtain a passing grade but for emergency reasons they have missed a minor part of the course requirement. Any missed final examination or other final course evaluation requires a student explanation within 48 hours so that the instructor can file the proper course notation with the Registrar's Office. A student who has evidenced an unsatisfactory course record, who has failed to complete a major portion of an instructor's course requirements, or who has failed to provide an instructor with a satisfactory reason for absence from a final examination or final course evaluation within the specified 48-hour period may not be assigned the letter symbol "INC". Responsibility for making arrangements with an instructor to complete all outstanding course work rests entirely with the student, who must complete all course work by the end of the official make-up period.

Please note that make-up final examinations administered by Continuing Studies are done so only on specific dates. The instructor is responsible for administering the make-up final examination if the student does not take the exam on the specified make-up dates.

Instructors who file letter symbols of "INC" also must file an end-of-course letter grade, which will be assigned in the event that incomplete course work is not made up by the student prior to the established deadline. At the end of the official make-up period (or in the event of a substantiated student emergency, at the end of an extended make-up period), the Registrar's Office will convert the temporary notation of "INC" to the appropriate permanent symbol. This permanent notation will be one of the following: 1) a letter grade that has been filed by an instructor during the grading period of the previous semester to designate the final course standing of

a student who has failed to make up incomplete course requirements, 2) a letter grade that is filed by an instructor at the end of the make-up period to designate the final course standing of a student who has made up incomplete course requirements, or 3) the letter symbol of "X" that must be approved to designate that a student has withdrawn from the University after the end of the semester for documented medical or personal emergency.

Limited extensions of the make-up period may be granted to students for serious medical reasons and for documented personal emergencies. Requests for such extensions must be approved and must be filed no later than one calendar week preceding the established deadline for instructors to submit final grades for incomplete courses. Except for extraordinary circumstances acceptable to the Dean, the maximum period for which an extension may be granted is the last scheduled class day of the semester following the assignment of "INC" notations.

Grade Changes

At the end of each semester, grades are available to students via their self-service account on ISIS. All course grades become a part of the student's official record upon instructor assignment and may not be changed, except as specifically provided by University procedures. Corrections of grade point averages automatically are authorized when grade reports are corrected by instructors and when specific courses are deleted from grade point averages under provisions of University regulations governing repeated failed courses, change of enrollment status as an intercollegiate transfer within the University, and expiration of degree credits.

Students who believe that a mistake has been made in assigning or recording a course grade should notify instructors as soon as possible after receiving their grade reports but, in no case, at a time later than the deadline established for making grade corrections. The deadline for instructors to correct an erroneous grade report is one calendar month from the beginning of the semester following the filing of an erroneous grade. Changes of grades, other than the filing of grades for incomplete courses, require endorsement from Continuing Studies, Corporate and Distance Education. Grade changes may not be made on a student's permanent record after the deadlines cited above unless such changes have been authorized prior to the expiration of the correction deadline.

Repeated/Deleted Course Work: General Policies

Course repetition/deletion is permitted only in accordance with the policies cited below, the provisions of which are applicable only to courses taken at the University of Massachusetts Lowell. Course substitution is not permitted under the provisions of this regulation unless a course has been dropped as a University offering and an alternate course has been authorized as a suitable substitution by the Coordinator of a student's program. Once a student has reached the credit limitations that are cited below, no further courses may be deleted or repeated for the purpose of grade substitution. A student who has used the maximum number of course deletions and repetitions for the purpose of grade substitution may not petition to revoke any of the substitutions in order to permit additional grade substitutions in other courses.

Grade Substitution/Deletion Rule

Students who have entered the University as freshmen or transferred to the University with less than 60 semester credits are permitted a maximum of 15 semester credits of course deletions/repetitions with grade substitution for the purpose of adjusting cumulative grade point averages. (Transfer students who have entered the University with 60 or more credits are permitted a maximum of 7 semester credits of course deletions/repetitions for this purpose.) Only courses with grades of "C" and "D" and lower may be deleted or repeated for the purpose of grade substitution. The original credit and grade assigned for both repeated and deleted courses will be retained in brackets, and the student's original GPA and academic status will remain in appropriate semester footings for courses that are subsequently deleted/repeated.

Repetition of Passed Courses

Except for courses of a professional nature that regulations of a college may designate as being non-repeatable, students may repeat a course previously passed with a grade of "D+" or "D" within the provisions of the grade substitution rule cited above. When a previously passed course has been repeated within the provisions of this regulation, the cumulative grade point average is appropriately corrected for the semester in which the course is repeated. When repeating a course for the purpose of grade substitution, if the grade for the repeated course is lower than the original grade, the repeated course grade shall not apply to the GPA and the original grade shall remain. When repeating a course outside of the grade substitution rule, both grades will count in the grade point average. However, credit is never granted twice for a course that has been taken and passed and, subsequently, taken again and passed for the second time.

Repetition of Transferred Courses

When competence is demonstrably inadequate, a student who has been granted transfer credit (and on this basis has been assigned to advanced courses for which the transferred course is a prerequisite) may be advised to repeat such transferred work at the University or to take a more elementary course than that which has been transferred.

Permission to repeat a transferred course is granted by filing an Academic Petition Form with the Faculty Program Coordinator. Since credit may not be granted more than once for the completion of any course, a condition for filing such a petition is the simultaneous filing of a request to revoke recognition of the previously transferred course.

Off-Campus Study

Matriculating students in satisfactory academic standing may be permitted to apply off-campus courses to their degree programs when they comply with established procedures. Students wishing to apply credits earned off-campus must obtain approval prior to off-campus enrollment, through an Authorization of Off-Campus Courses form.

Off-campus courses may be taken in regionally accredited institutions only, and ordinarily should be taken at baccalaureate colleges or universities. Permission to pursue off-campus courses in regionally accredited associate degree institutions may be granted to students with less than 60 earned credits and only for courses that are to be presented for lower-division requirements of University of Massachusetts Lowell curricula. All off-campus courses must be taken under the regular grading system and may not be taken on a pass/no credit (pass/fail) basis.

University Restrictions Concerning Off-Campus Study

Students are not permitted to pursue off-campus courses until an initial evaluation of their academic progress at the University has been made. Students who have transferred to the University with 60 or more semester credits, or who have been admitted from another institution with a baccalaureate degree to pursue a second bachelor's degree, are not permitted to pursue off-campus studies. Students who combine University courses with off-campus courses during the regular academic year are subject to University restrictions on semester course loads.

Course Equivalency Examinations

Subject to specified policies of academic departments, qualified degree candidates are given the opportunity to demonstrate their special competencies and to receive University credit for such competencies through established course equivalency procedures without having to fulfill classroom or faculty course requirements. The University recognizes two types of course equivalency for which credit is awarded. These are:

1. CLEP Examinations
   College Level Examination Program (CLEP) is a national program of credit-by-examination that offers the opportunity to obtain recognition for college level achievement no matter when, where or how learning has been acquired. These examinations can be taken in general subject areas or in specific subject areas. If the results of the examination(s) are acceptable to University guidelines, college credit is given toward an undergraduate degree.

   Please note that the College of Arts and Sciences does not recognize and will not award credit for CLEP tests in a foreign language offered to satisfy the language proficiency requirement.

2. Departmental Examinations
   Students interested in taking departmental examinations must first arrange an interview with the appropriate Program Coordinator, at which time they must present evidence that they possess sufficient competency to warrant a departmental examination. Departmental examinations will not be given if a corresponding CLEP examination is available. Departments also reserve the right to refuse the granting of credit by examination for those courses that are presented by students for their major. When written permission is given to a student to take a departmental examination, the conditions of the examination will be set forth. Typically, the examination must be wholly or substantially written unless the nature of the course makes more appropriate an oral or performance examination. Students may be asked to take end-of-semester examinations, which are scheduled during the final examination period, when such examinations are adequate measures of total course requirements. A fee must be paid after the departmental exam form is signed by the Coordinator and the student, and before the student takes the examination.

   Students may not repeat departmental equivalency examinations and, except for documented medical reasons or personal emergencies, they may not reapply for such examinations in the event that they fail to keep an examination appointment.

Students may not receive credit for a specific proficiency examination:

1. If they have registered at the University in the course which that examination represents;
2. If they have previously received a University grade for that course or a course in sequence above the course for which they wish to take the examination;
3. If they have previously attempted an equivalent course at another institution; and
4. If a general examination is related to the student's academic major.

Bachelor's Degree students may apply for course equivalency credits up to a maximum of 30 credits; however, the total number of equivalency and transfer credits may not exceed 90 credits for the baccalaureate degree; nor may transfer students present equivalency credits in fulfillment of the major field residency requirement of 15 credits in University courses or the general residency requirement of 30 credits (see pages 42-43 for details on residency requirement).

Directed Study

A directed study is ordinarily an alternative arrangement for enrolling in an advanced course not being offered during a particular semester. It allows the student to meet on a regular basis with an instructor who is willing to undertake the course. The student must complete the Request for Directed Study Form which lists the course, meeting dates, assignments, papers or projects to be completed; and the form should be signed by the instructor, Faculty Program Coordinator, and Director of Enrollment Management and Administration before the student may register. Students enrolled in the day school also must obtain approval from the Dean of the College before they can register for directed study. Because directed studies are considered special programs, tuition remission and certificates of eligibility cannot be used.

Instructor Course Requirements

At the first class meeting, instructors must distribute a written statement of requirements for each course to all students and to Continuing Studies. This statement must include prerequisites, if any, attendance policy, a specification of the number and types of course evaluations to be employed throughout the semester (including the dates of the examinations), special requirements for completing assignments and taking examinations, and a definition of course attendance policy. Normally, a minimum of three evaluations of student progress (written or oral examinations, written reports, recitations, laboratory techniques and reports, jury or performance evaluations) should be made in each course, at least one evaluation being required during each half semester. Upon the request of a student, an instructor is required to provide a statement of the student's course progress. Prior to the last date for withdrawing from courses, students who are in danger of receiving "D" or "F" grades either shall be so notified by the instructor or shall be in possession of such course evaluations as will permit such students to reasonably infer their course progress and academic jeopardy.

Course Examination Policies

Final examinations are required for all undergraduate courses. Final examinations may not be given at a place or time other than those that have been specified. Make-up examinations are the responsibility of the instructor.

Class Standing

Freshman Standing	0-29 credits
Sophomore Standing	30-59 credits
Junior Standing	60-89 credits
Senior Standing	90 credits or more

Class Size

Courses are only offered if enrollment is sufficient. Consequently, to ensure the scheduling of desired courses, students are urged to register early. In the event that a course is cancelled, Continuing Studies will try to notify preregistered students. Students may also monitor their schedules on ISIS.

Attendance

Although the University does not require class attendance as a matter of institutional policy, course instructors may establish required attendance in their courses and specify violations of such attendance requirements. Examinations or other work missed by absence may, at the option of the instructor, be made up or failed (except for provisions provided by absences due to religious reasons).

Academic Standing

Academic standing and eligibility for a degree are determined by the quality of the student's course work.

Determination of Academic Standing

To ascertain the student's academic standing, the University uses a point system, each qualitative grade having an equivalent numerical value.

A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
F	0.0

Quality points are computed by multiplying the number of course credits by the numerical value of the qualitative grade assigned. For instance, a three-credit course with a grade of "B+" would carry 9.900 quality points (3 x 3.300). Grade point averages and cumulative grade point averages are obtained by dividing the number of quality points earned by the number of quality hours attempted.

Specified grade point averages are computed solely on the basis of those courses attempted at the University of Massachusetts Lowell that have been qualitatively evaluated with the following letter grades: A, A-, B+, B, B-, C+, C, C-, D+, D, and F.

All students are required to maintain at least a 2.000 average throughout their academic career. Academic records are evaluated at the end of each semester. No student, however, will be academically suspended without having at least one semester of academic warning.

The academic status of a student is one of the following categories:

Satisfactory Academic Standing

A student whose semester grade point average is at least 2.000 and whose cumulative grade point average is at least 2.000 is in Satisfactory Academic Standing.

Academic Warning

A student whose semester GPA is below 2.000 is placed on Academic Warning. A student on warning is still considered to be in acceptable academic standing, may register for the following semester and may participate in campus and athletic activities. Certain campus programs and activities may choose to prohibit the participation of students on Academic Warning. At the end of their warning semester a student's cumulative grade point average must be equal to or greater than 2.000 to continue in Satisfactory Academic Standing.

Academic Suspension

A student who was on Academic Warning at the end of the previous semester and whose cumulative GPA falls below 2.000 is placed on Academic Suspension. A student who is on Suspension may not enroll in the succeeding semester, and therefore may not represent the University in athletic programs nor participate in campus activities.

Academic Dismissal

A student who was on Academic Suspension at the end of the previous semester and whose cumulative GPA at the end of the probationary semester is below 2.000 is automatically dismissed from the University.

Appeal of Suspension

A suspended student may submit a written appeal to the Director of Continuing Studies, requesting permission to continue enrollment for an additional semester on academic. This appeal will be reviewed by the Program Coordinator. If permission to continue is granted, the program of study that must be undertaken and the minimum semester grade point average that must be attained during the additional semester of academic warning will be made explicit.

Grades earned during summer session or winter intersession may be used to change a student's academic status prior to the beginning of the following semester. A student who has been suspended is prohibited from enrolling in any credit-bearing program of the University, including credit courses offered by Continuing Studies, in summer sessions, or in winter intersession. If a suspended student chooses to enroll in another accredited degree-granting institution, earns credit at that institution, and subsequently seeks to return to UML, such credit may or may not be accepted in transfer at UML, depending upon the specific circumstances.

Students who enroll in University summer school and/or Continuing Studies courses after they have been notified by the Registrar's Office and the Provost's Office that they are suspended from the University for unsatisfactory academic standing are in defiance of University regulations. Grades received by such students will not be credited to University baccalaureate programs, even if the students are subsequently reinstated as probationary students or achieve satisfactory academic standing after reinstatement.

Academic Probation

A student who has been suspended from the University is entitled to apply to the Director of Continuing Studies for immediate readmission as a probationary student in accordance with procedures enumerated under the Probationary Readmission policy below.

Probationary Readmission

Students who have been suspended and decide to remain un-enrolled for a semester or more must apply for readmission on probation through the Admissions Office whenever they decide that they are prepared to undertake such a probationary period. The student will receive a letter that specifies the conditions of their probation, and the semester average that they must achieve during their probationary semester in order to achieve satisfactory academic standing.

A student who achieves the required minimum semester grade point average during his or her probation is automatically reinstated as a student in satisfactory academic standing.

Extended Academic Probation

Students whose academic performance during a probation semester has significantly improved, but whose cumulative grade point average is still slightly below 2.0, may apply to the Associate Provost for an extended period of probation. Students who are granted such extensions will be notified in writing prior to the beginning of classes for the following semester that they have been granted an additional semester to achieve satisfactory academic standing.

Students who fail to achieve satisfactory academic standing and are not granted extensions of their probations by the Associate Provost and students who are granted such extensions and fail to achieve satisfactory academic standing are dismissed from the University.

Students readmitted on probation should not withdraw from any course unless they withdraw from the University for emergency or medical reasons. A probationary student who withdraws from any course may thus be unable to satisfy the conditions of his or her probation and may be dismissed from the University at the end of the current semester of enrollment.

Probationary students who receive course evaluations of "INC" (incomplete) and who fail to make up their work prior to the beginning of the next semester are advised that they may not qualify for extension of their probation and may not register for or attend University courses (including Continuing Studies courses) until such time as a final determination of their status has been made. Probationary students who have received permission from the Associate Provost to extend their make-up period should understand that such extension does not waive the requirement for a final determination of academic standing that is based upon grades for all probationary courses.

Academic Dismissal

Students on academic probation who fail to achieve satisfactory academic standing during their probationary semester and are not granted extensions of their probation by the Associate Provost and students who are granted such extensions and fail to achieve satisfactory academic standing are dismissed from the University and are subsequently barred from attending both day and evening courses.

While on dismissal, students are not allowed to make progress toward a University degree. Students who have enrolled in University summer school and/or Continuing Studies courses after they have been notified by the Student Records Office that they are dismissed for unsatisfactory academic standing are in defiance of University regulations. Grades received by such students will not be credited to University baccalaureate programs even if the students are subsequently reinstated as probationary students or achieve satisfactory academic standing after reinstatement.

The University recognizes that dismissal from the institution for reasons of academic failure need not be permanent. Under the following circumstances readmission is possible:

Freshman and sophomore students (attempted less than 60 credits) who have been academically dismissed may qualify for readmission to the University as follows: 1) under the provisions of the Massachusetts Transfer Compact after completion of an associate's degree at a Massachusetts Community College; and 2) after a lapse of two years, under the provisions of the Fresh Start Program.

Students of junior or senior standing at the time of dismissal may reapply to the University after an absence of at least two years, under the provisions of the Fresh Start Program.

The procedure for readmission of academically dismissed students begins with filing an application with the Admissions Office. The final decision to readmit an academically dismissed student rests with the dean of the college in which the student was enrolled at the time of dismissal from the University.

Fresh Start Program

Students who have been absent from the University for two years or longer may be readmitted under the terms of the Fresh Start Program. Under this program, a returning student will be treated as if he or she were a transfer student. Courses completed during earlier periods of enrollment with grades of "C" or above will be accepted toward graduation but will not be included in the cumulative average. Courses completed during earlier periods of enrollment with grades below "C" will not be counted toward graduation or included in the cumulative average.

A maximum of 75 earlier UML transfer credits will be accepted toward graduation, and after readmission under the Fresh Start Program the student must earn a minimum of 45 credits in residence at UML in a matriculated program of study.

Courses taken in the academic major during earlier periods of enrollment must be approved by the major department before those courses can be counted toward the requirements of the major. (This provision is especially important in majors that undergo regular curriculum revision).

Student Rights and Responsibilities

This section outlines student responsibilities and pertinent state and federal laws that protect a student's rights with respect to privacy, discrimination, harassment and affirmative action.

STUDENT RESPONSIBILITY

In registering for courses and/or accepting admission into the University, each student assumes responsibility for knowledge of and compliance with the definitions, regulations and procedures of the University pertaining to his or her student status as set forth in the appropriate University of Massachusetts Lowell, Division of Continuing Studies, Corporate and Distance Education publications and catalog.

It is the student's responsibility to become familiar with all the regulations and procedures required by the academic program being pursued. In no case should students expect waiver or exception to published program requirements by pleading ignorance to the regulation or asserting that a Faculty and Student Support Specialist or other authority did not present the information correctly. All students are expected to become familiar with the academic information section of this catalog and the specific program requirements.

Students must pay for University equipment that they have broken or damaged, provided that such breakage does not occur while the student is under direct supervision of the instructor. In some instruction, students are required by law to wear safety glasses or other safety devices. The instructor of such classes will inform students of their obligation to obtain and wear the necessary safety protection.

Students who have questions about the interpretation or application of University policies should consult with the Academic Counselors or the Faculty Program Coordinators.

Student Status Committee

The Student Status Committee of the Registrar's Office meets approximately every six weeks to review petitions on a variety of issues submitted by students. Students are requested to submit appropriate documentation with their petitions, and they will receive a determination in writing.

ACADEMIC INTEGRITY POLICY

The integrity of the academic enterprise of any institution of higher education requires honesty in all aspects of its endeavor. Maintaining academic integrity is therefore the responsibility of all faculty, staff and students at the University of Massachusetts Lowell.

Academic dishonesty is prohibited in all programs of the University. Sanctions may be imposed on any student who has committed an act of academic dishonesty. Academic dishonesty includes but is not limited to:

Cheating – use, or attempted use, of trickery, artifice, deception, breach of confidence, fraud or misrepresentation of one's academic work.

Fabrication – falsification or invention of any information or citation in any academic exercise.

Plagiarism – representing the words or ideas of another as one's own work in any academic exercise.

Facilitating dishonesty – helping or attempting to help another commit an act of academic dishonesty, including substituting for another in an examination, misrepresenting oneself or allowing others to represent as their own one's papers, reports or academic works.

Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. The procedures outlined below are intended to provide the process by which sanction may be imposed if it appears that academic dishonesty has occurred, and by which students may appeal such sanctions.

Procedures Concerning Acts of Academic Dishonesty

These procedures apply to all students and faculty participating in academic classes and programs, including all graduate, undergraduate and CSCDE programs. The procedures associated with this policy are the only official procedures for making allegations of, issuing sanctions because of, or appealing charges of academic dishonesty.

Process*

Any faculty member of the University community may initiate charges of academic dishonesty by following the procedures outlined below.

When academic dishonesty is suspected, the faculty member (complainant) must notify the student, written or oral, of the incident to review what was observed and what sanction will be imposed. Notification to the student must be delivered no later than ten business days after recognizing the alleged incident. The faculty member must fill out a "Notification of Academic Dishonesty Form" available online at the website for the Office of the Registrar and email or fax this form to the Associate Provost or designee. In lieu of the form, an email with the necessary information will suffice.

1. The Associate Provost or designee will send the student official notification of the sanction via certified mail.
2. The Associate Provost or designee will maintain this information and record the sanction. The record will be kept until the student graduates UML.
3. If the student admits to the charges and accepts the sanction the process is finished.
4. If the student is found innocent of the charges all records of the incident will be destroyed.

Appeal

If the student denies responsibility or believes that the sanction is too severe, the student may appeal the sanction to the Academic Dean of the college of the complainant's department or designee in writing, within five business days of receiving notification of the incident. During the appeals process the student is expected to continue attending the class in which the sanction has been issued unless prohibited by department policy. The Academic Dean or designee will commence a review of the issues raised in the appeal and forwards the decision to the office of the Associate Provost as soon as practicable.

1. The Associate Provost or designee must notify the student, by certified mail, and other relevant parties of the outcome of the appeal process.
2. The Associate Provost or designee will maintain this information and record the sanction. In cases of multiple violations of the Academic Integrity Policy the Associate Provost may initiate further review.

Appeal of Due Process or Sanction

The decision reached by the Academic Dean or designee is final and may only be appealed if the student believes that he or she did not receive due process or maintains the sanction is too severe. Appeals may be filed by the student or complainant to the Associate Provost or designee within three business days of receipt of the decision. Such appeals shall be in writing and shall be delivered to the Associate Provost or designee, and must be based on the "Grounds for Appeal." The Associate Provost or designee may decide to uphold the decision of the Academic Dean or designee or convene the Academic Integrity Appeals Board ("Board"). All decisions by the Associate Provost or designee are final and may not be appealed. Such decisions will be made as soon as practicable.

**The chair of the department (in which the course taken by the student resides) shall be notified at each step of the process.*

Grounds for Appeal of Due Process or Sanction

An appeal shall be limited to a review of supporting documents and the process and outcome of the Academic Dean or designee for one or more of the following grounds:

1. Bias by the Faculty, Academic Dean or designee substantially influenced the outcome of the process to the detriment of the student.
2. If new, relevant information has come to light that was not available at the time of the hearing by the Academic Dean.
3. If the sanction is inappropriate for the offense.
4. If unusual procedures were followed or if the procedures outlined herein were not followed, and such unusual procedures or the failure to follow procedure affected the decision of the Board to the detriment of the student.

Academic Integrity Appeals Board

Membership:

The Academic Integrity Appeals Board is chaired by the Associate Provost or designee. The Associate Provost or designee will vote only in the case of a tie. The Board consists of a minimum of three faculty members chosen by the Associate Provost or designee with no two members selected from the same College and cannot include a faculty member within the department initiating charges of academic dishonesty.

Procedures:

In cases heard by the Board, the following procedures apply:

1. The Associate Provost or designee will notify the student and complainant in writing of the date, time and location of the hearing. Hearings are closed and recorded. All information is maintained in the Office of the Associate Provost.
2. An appeal shall be strictly limited to a review of the process and stated grounds for appeal, except as required to explain the basis of new information.
3. The student must direct all questions or concerns about any related matter or hearing to the chair of the Board.
4. The student may only correspond about his or her case with Board members and witnesses during the Board hearing.
5. When new information is presented, both the student and complainant will be allowed to be present.
   a. Before the hearing the student and complainant may review any new evidence that will be introduced to the appeal hearing.
   b. The student appearing at the hearing may have an advisor of his or her choice from the University community. The advisor may neither address the Board nor participate in the proceedings. The advisor cannot also be a witness for the student (see Right to an Advisor).
   c. The student and complainant may hear and question witnesses pertaining to the new evidence. The chairperson reserves the right to allow only those questions that are relevant to the new evidence.
6. The Board will make its decision promptly and communicate it to the student in writing by certified mail within five business days upon completion of the deliberations. The decision of the Board is final and may not be appealed. The Board has the following options:
   a. To decide to uphold the original decision.
   b. To dismiss the charges.
   c. To impose a sanction other than the initial sanction.
   d. To refer the incident for a new hearing to an alternate Academic Dean. If the incident is referred for a new hearing the appeal process is reinitiated.

Right to an Advisor

A student may elect to be accompanied at all proceedings of the disciplinary process by an advisor of his or her choice. The advisor must be a current member of the faculty, staff or student body of the University. The role of the advisor in all cases is limited to advising the student during the academic dishonesty proceedings. The advisor may not speak on behalf of the student, or examine or cross-examine a witness, or address the process publicly during proceedings.

Accommodations for Students with Disabilities

The University of Massachusetts Lowell is committed to providing appropriate accommodations to students with documented disabilities so that all students have meaningful access to all UMass Lowell programs and services, including the Academic Integrity Process.

All those with disabilities who are involved in the Academic Integrity Process, including accusers and accused students, advisors, and witnesses may seek accommodations for any stage of the Academic Integrity Process. Any student requesting an accommodation must do so far enough in advance to allow the request to be reviewed and an appropriate accommodation identified and implemented. Although there is no firm deadline beyond which an accommodation cannot be requested, the student will be held accountable for making any request in a timely fashion: The University may not be able to provide an accommodation unless it is requested at least five working days before the accommodation is needed.

A request for accommodation can be made to the Director of Disability Services ("Director"), the designated Academic Dean or the Associate Provost. The requests will be reviewed by the Director, who will apply appropriate legal standards and University policies and procedures to determine what accommodation, if any, is appropriate. The student will be given an opportunity to have an interactive role in the review process (i.e., to discuss the request with the Director, before the Director completes the review). The Director may require the student to provide appropriate documentation from qualified health care professionals to support the request. In addition, the Director may consult, as appropriate, with the Academic Dean or the Associate Provost, or another expert of the Director's choosing. The Director will make a decision in light of the student's particular disabilities and the nature of the Academic Integrity Process, upon reviewing any consultations, relevant documentation and relevant previous accommodations provided to the student. The student will be given an explanation of the Director's determination.

If the student requesting accommodations disagrees with the Director's determination on appropriate accommodations, he may appeal the determination to the Office of ADA Compliance (Office of Equal Opportunity and Outreach) within five working days of the Director's decision.

Student Complaints

Complaints Arising from Grades and Grading Policy of the Faculty Member

Faculty are expected, as a matter of right and professional standards, to recompute any grade in which a computational error is alleged or suspected, provided that the student challenges the grade before the deadline established by the calendar for filing final course grades and changes. However, no challenge or appeal shall be allowed in the matter of grades and grading policies except when a faculty member is alleged to have violated University, College or Department academic regulations and policies, or the faculty member's own grading policy, the latter to be determined from the syllabus for the course or section in question.

Appeals of grades or grading policies arising from alleged violations of established or published policies will follow procedures cited below under the heading "Complaints Concerning Classroom Matters." The terms "grade" and "grading policy" refer to: 1) all grades awarded; 2) the computation of grades for examinations (including final examinations), tests, quizzes, paper essays, laboratory reports, practice experiences, and any other kind of academic activity for which a grade of any kind is awarded; and 3) the final course grade, which is submitted directly to ISIS by the faculty.

Complaints Concerning Classroom Matters Exclusive of Grades and Grading Policy

Students confronting classroom problems that are a source of legitimate concern are entitled to have their complaints heard and resolved according to the procedures specified below.

Classroom problems may include but are not limited to the following examples (but note that questions concerning grades and grading policies are reserved to the process specified above):

1. Faculty failure to observe University of Massachusetts Lowell Division of Continuing Studies policy and/or regulations, such as violating the regulation against scheduling examinations (with the exception of final exams) during the last week of the semester;

2. Changing class schedules or rescheduling of final examinations without permission of the Director of Enrollment Management and Administration;

3. Terminating semester classes prior to the date specified by the Division of Continuing Studies calendar;

4. Failing to fulfill instructional obligations (such as unjustified cancellation of class, frequent absenteeism and lateness);

5. Failing to provide and distribute a written statement of course requirements, which is mandated for all instructors;

6. Failing to adhere to the written statement of course requirements.

Students normally should seek to resolve problems by discussion with the faculty member. If this is not feasible or if, after discussion, the matter cannot be resolved, the student shall inform the faculty member in writing that he or she will initiate a formal complaint. This complaint shall be in writing and shall be addressed to the Faculty Program Coordinator of the discipline in question and the Director of Enrollment Management and Administration for Continuing Studies. After discussing the problem with the student and the faculty member, the Faculty Program Coordinator and the Director will determine if the complaint is valid.

Formal complaints about classroom problems shall be initiated before the last day of the semester examinations in the semester during which the violation is alleged to have occurred. The determination of the Program Coordinator and Director shall be made within 10 working days following receipt of the student complaint.

University Policies

Right of Access to Student Records

The Family Educational Rights and Privacy Act of 1974 (FERPA) grants any student currently in attendance, or to any former student, the right of access to inspect or review his or her educational files, records, or data. Students who wish to inspect their records must file a Right of Access Form with the office or department in which the desired record is kept. Right of Access Forms are available in the Office of Student Services or through self service on ISIS. Within 10 days of receipt of the Right of Access Form, the office or department will notify the student as to the date, time and location that the desired record will be available for inspection.

The file of each student must contain a record of all non-University affiliated individuals or organizations requesting access to it, plus statements that specify the legitimate educational purposes for which access was requested. The record of access may be released only to University personnel or to state or federal officials as a means of auditing the reporting of access to student records. Information of records concerning individual students may not be released to any individual or agency without written permission of the student. Any request for such information received without such written notice will not be honored and will be returned with a request for a written release by the student.

Educational records may be released without permission to the following individuals or agencies under the following specific conditions:

1. Personnel of the University, i.e., faculty, administrators or staff for legitimate educational purposes only;

2. Officials of other institutions in which the student is enrolled, provided that the student is notified of the release;

3. Federal or state officials in connection with the audit and evaluation of programs funded by the federal or state governments or in connection with the enforcement of legal requirements that relate to such programs or in connection with the student's application for or receipt of financial aid;

4. State and local officials pursuant to any state statute adopted prior to November 19, 1974;

5. Organizations conducting studies for the purpose of developing predictive tests, administering student aid programs and improving instruction;

6. Accrediting organizations in order to carry out their accrediting functions;

7. Parents who claim the student as a dependent on their IRS statement; and

8. When necessary, in an emergency, to protect the health, safety or welfare of the student or others, to persons who are in a position to deal with the emergency. The following data is considered informational in nature and may be released, without permission of the student, at the discretion of the University: name, city/town of residence, date of birth, previous educational institution(s) attended, major field of study, dates of attendance, awards and honors received, degrees conferred. Any student who believes that his or her records are inaccurate or misleading may request a meeting with the Division of Continuing Studies to discuss the contents of such records. Additional information on procedures or policies relating to University compliance with the Family Rights and Privacy Act can be obtained from the Office of Student Services.

Affirmative Action

The University of Massachusetts Lowell is an Equal Opportunity/ Affirmative Action University and does not discriminate in employment or access to programs or services on the basis of race, sex, sexual orientation, color, national origin, religion, handicap or veteran's status and is in compliance with Title IX of the Education Amendments of 1972, and Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990. Any inquiries and/or grievances may be referred to the Office of Equal Opportunity, the Title IX Coordinator, the Disabilities Coordinator and/or to the Director, Office for Civil Rights, U.S. Department of Health and Human Services, Washington, DC.

Equal and Fair Treatment

Under federal and state laws, all students are protected from discrimination based on race, color, religion, national origin, disability, gender (including sexual harassment), age, sexual orientation, marital or veteran status. If you feel that you have been discriminated against based upon any one of these areas, you must contact Equal Opportunity and Outreach (EOO), Cumnock C-4, North Campus. These protections also include retaliation for filing complaints of discrimination. Concerns regarding course offerings, instructor and student attitudes should also be directed to EOO staff. Students are responsible for adhering to the policies of the University regarding equal and fair treatment.

Absences Due to Religious Beliefs

Chapter 375, Acts of 1975 of the Commonwealth of Massachusetts requires recognition of student religious beliefs as noted.

"Any student...who is unable, because of his religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such examination or study or work requirement and shall be provided with an opportunity to make up such examination, study, or work requirement which he or she may have missed because of such absence on a particular day; provided, however, that such make-up examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the Institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of his availing himself of the provisions of this section." Students should inform the course instructor in writing of the days.

Policy Changes

Although the Division of Continuing Studies provides notice concerning changes as is reasonably practical under the circumstances, Continuing Studies reserves the right to change requirements, subjects, courses, faculty listings, regulations and other policies stated in this document.

The Division of Continuing Studies reserves the right to close a course, cancel a course, alter the scheduled time or faculty listing, change the schedule without formal notice, implement new rules and regulations, and to make changes of any nature in its program, calendar, procedures and standards, and academic schedule including, without limitation, changes in course content and class schedules.

The Division of Continuing Studies periodically releases special announcements or changes from departments, colleges and the University. When feasible, the Division directs instructors to read or distribute these in classes. Special announcements and policy changes may also be posted in the Continuing Studies Course Bulletin each semester and on the website at http://continuinged.uml.edu.

Administrative policies of a system-wide nature (e.g., admissions policies, tuition and fees) are subject to change by the Board of Trustees of the University of Massachusetts Lowell and the Massachusetts Board of Regents of Higher Education without advanced notice.

Every effort has been made to ensure the accuracy of the information presented in this catalog. However, Continuing Studies reserves the right to implement new rules and regulations and to make changes of any nature to its program, calendar, procedures, standards, degree requirements, academic schedules (including, without limitations, changes in course content and class schedules), locations, tuition and fees. Whenever possible, appropriate notice of such changes will be given before they become effective. When changes are necessary, the Division of Continuing Studies at the University of Massachusetts Lowell exerts reasonable efforts to provide comparable or substantially equivalent instructional services and facilities for those originally designated. However, it assumes no liability for failure to deliver or for delay in delivering such services (including those in support of academic functions or student life) when the causes for such failure or delay are beyond the reasonable control of Continuing Studies - which causes include, without limitation, the following: power failure, fire, accident, natural disaster, work slowdown and strikes, loss of personnel, changes in funding and acts of public authorities.

In registering for courses, each student assumes full responsibility for knowledge of and compliance with the definitions, regulations, and procedures for the University as set forth in the appropriate publications and bulletins.

University's Annual Campus Crime and Safety Report

The University's Annual Campus Crime and Safety Report, which includes campus crime statistics and information about campus alcohol, drug and sexual assault policies as well as other important matters, is available on the web at http://www.uml.edu/police/crime_info/crime_info.html. Paper copies of this report are available upon request at University Police, 125 Ball Hall, (978) 934-2384 and at the Office of Student Services, Cumnock Hall, (978) 934-2100.

Institutional Disclosure

Institutional disclosure of information according to the Higher Education Act is available at http://continuinged.uml.edu/general/inst_disclosure.htm

part-time associate's and bachelor's

degree programs

Degree Programs: Admission Requirements, Residency, Transfer Information, General Education Requirements and Graduation

Associate's & Bachelor's Degrees Curriculum Outlines

"UMass Lowell's degree programs offer flexible electives and concentration areas to match your interests and career goals."

-- Ann Marie Hurley, Professor of Mathematics and Coordinator of Information Technology Programs

A Step-by-Step Guide to Pursuing A Part-Time Undergraduate Degree at UMass Lowell

REQUIRED:

- Select your desired degree program and complete the degree program application for admission. To view a complete list of the degrees Continuing Studies offers on a part-time, evening basis, visit http://continuinged.uml.edu/degrees
- Mail the application with the $40 application fee (subject to change) to:
  University of Massachusetts Lowell
  Admissions/Continuing Studies, Corporate and Distance Education
  Dugan Hall, Room 110
  Attn: Kathleen Shannon
  883 Broadway Street
  Lowell MA 01854-5104
- Contact the high school or college where you most recently took courses and ask them to send out official transcripts to Admissions/Continuing Studies at the address above.
- International students must have their transcripts evaluated by the Center for Educational Documentation. (http://www.cedevaluations.com)
- Register for courses
- Once your application and transcripts have been received, you will receive a confirmation letter from Admissions/Continuing Studies.

RECOMMENDED:

- Attend a Continuing Studies Open House/Orientation.
- Speak with a Faculty and Student Support Specialist to review degree requirements and transfer credits. (http://continuinged.uml.edu/general/advising.htm)
- Contact the Financial Aid Office to see if you're eligible for assistance. (http://www.uml.edu/financialaid/)
- If you're a veteran, senior citizen or your employer provides tuition assistance, check your eligibility for tuition waivers/remission.
- Become familiar with University policies and regulations in this catalog.
- Contact the Continuing Studies Faculty and Student Support Center with any questions at (978) 934-2474, email Continuing_Education@uml.edu or drop by Southwick Hall Room 202 on UML North, Monday through Thursday from 8:30am to 8:00pm and on Friday from 8:30am to 5:00pm.

Degree Programs: Admissions Requirements, Residency, Transfer Information, General Education Requirements and Graduation

Are you considering taking a degree program part-time, online or during evening hours? Our Faculty Program Coordinators will work with you to evaluate transfer credits and build a degree around your unique needs.

Continuing Studies offers a number of degree programs through the individual colleges at the University of Massachusetts Lowell. Students enroll in these programs to obtain practical knowledge and skills, to sharpen skills for professional advancement, to facilitate a career change, and to gain personal enrichment and satisfaction. These associate's and bachelor's degrees can be completed part time, during the evening and summer sessions. For further information on degrees available completely online, visit our website at http://continuinged.uml.edu/online. Degree candidates must officially apply for admission.

Since undertaking a degree program requires careful planning and scheduling of classes, students are encouraged to meet with a Faculty Program Coordinator prior to registering for courses. Program Coordinators and Student Support Specialists can help students select courses, plan a program of study, and evaluate transcripts of previous academic work. To arrange an appointment with a Faculty and Student Support Specialist, call the Faculty and Student Support Center at (978) 934-2474.

Admissions into Degree Programs

Students are welcome to register for credit or noncredit courses offered by Continuing Studies. Students who wish to pursue a certificate, an associate's degree, or a bachelor's degree must also apply for admission to a program through the Office of Admissions.

To be considered for acceptance into a certificate or degree program, students must hold a high school diploma or a General Education Development (GED) certificate. Students must be admitted to a degree program in order to be eligible for most financial aid.

The following materials must be submitted for admission:

1. A completed degree program application form, including a $40 degree application fee (subject to change);
2. Official transcripts of all college, university or post-secondary schools attended and course descriptions;
3. Official transcript of high school records, or its equivalent (GED certificate), from applicants with no previous college/university experience.

After the above information is filed, a Faculty Program Coordinator will evaluate the student's academic records. Qualified students will receive an official letter of acceptance and a transfer credit evaluation sometime after submitting all necessary academic materials. A student who has not yet completed 18 credit hours in his or her degree program will be admitted on a provisional basis. Academic Counselors and Faculty Program Coordinators are available to answer questions regarding programs and the matriculation process. Appointments may be made by calling (978) 934-2474.

Declaration of a Major

Upon application, students are requested to declare a major. Faculty and Student Support Specialists and Faculty Program Coordinators are available to help students in selecting a field of concentration. An early decision of a major by students will greatly facilitate the selection of appropriate prerequisite courses for major fields and, accordingly, will reduce the possibilities of time-consuming errors in judgment.

ASSOCIATE'S AND BACHELOR'S DEGREE REQUIREMENTS

University policy requires all degree candidates to comply with the following standards:

1. Mastery of at least one discipline, field of knowledge or applied professional area;
2. Competence in writing the English language;
3. An understanding of the humanities, social sciences, mathematics and science; and
4. A familiarity with problems and issues of value and choice.

All Associate's Degree candidates are required to earn a 2.00 (C) cumulative average, to complete a minimum of 60 semester hours, to fulfill the residency requirements, to conform to the general regulations and requirements of the University, to satisfy the regulations and academic standards of the colleges that exercise jurisdiction over the degrees for which they are matriculating, to satisfy the curriculum requirements established by the departments or programs in their major, and to complete the University General Education requirements.

All Bachelor's Degree candidates are required to earn a 2.00 (C) cumulative average in their total course of study, to complete a minimum of 120 semester hours of course credits, to fulfill the residency requirements, to conform to the general regulations and requirements of the University, to satisfy the regulations and academic standards of the colleges that exercise jurisdiction over the degrees for which they are matriculating, to satisfy the curriculum requirements established by the departments or programs in their major, and to complete the University General Education requirements.

Residency Requirements for Associate's Degrees

In addition to meeting all the course requirements of an Associate's Degree, candidates must adhere to the following residency requirements:

1. Each student must complete at least 9 semester credits in regular course work in his or her major department and must complete at least 24 semester credits through Continuing Studies at the University of Massachusetts Lowell.

2. A student may pursue an additional associate's degree under the same regulations set forth for pursuing an additional bachelor's degree except that the total number of credits to satisfy the residency requirement is 24.

Residency Requirements for Bachelor's Degrees

In addition to satisfying specific course and achievement requirements, each bachelor's candidate must complete at least 15 semester credits in regular course work within the major department of the University for each major that is presented for a degree with a 30 semester credit minimum completed through Continuing Studies. This 30 semester credit minimum may include authorized day courses in the University.

Each candidate for a baccalaureate degree must satisfy one of the following five residency requirements:

1. Complete an associate's degree under the provisions of the Massachusetts Transfer Compact at a Massachusetts community college, earning not more than 60 semester credits, and the remainder in courses at the University, earning not less than 60 semester credits, with 30 credits earned in Continuing Studies.

2. Complete up to the first two years in an accredited two-year institution earning not more than 60 semester credits with grades of "C" (2.0 on a 4.0 scale) or better, and the remainder in courses at the University, earning not less than 60 semester credits, with 30 credits earned in Continuing Studies.

3. Complete the equivalent of the first three years of a baccalaureate program in an accredited four-year institution, earning not more than 90 semester credits ("C" grades or better) and the remaining courses at the University, earning not less than 30 semester credits in Continuing Studies.

4. Complete 90 or more semester credits at the University (30 of which must be earned in Continuing Studies) and complete the remainder of an approved prescribed course of study at another accredited institution, earning not more than 30 semester credits at that institution.

5. Complete the equivalent of the first three years of a baccalaureate program at the University of Massachusetts Lowell and the remaining credits through Continuing Studies, earning not less than 30 credits (unless University of Massachusetts Lowell day classes are authorized).

The requirement of 30 semester credits of study in the University of Massachusetts Lowell's Continuing Studies courses may not be satisfied through course equivalency procedures.

Residency Requirement for Major Fields

Each bachelor's degree candidate must complete at least 15 credits of course work in their major *at the University of Massachusetts Lowell* for each major that is presented for a degree.

Guidelines for Additional Bachelor's Degrees

A student who has already earned a bachelor's degree may be admitted to the University to pursue an additional bachelor's degree in accordance with the following:

1. The nomenclature of the additional degree to be pursued must be distinctly different from the previously conferred degree (e.g., Bachelor of Arts, Bachelor of Science, Bachelor of Science in Engineering, Bachelor of Science in Business Administration);

2. The major field of the previous degree must be clearly distinct from that of the additional degree;

3. The work for the additional degree must include the Continuing Studies residency requirements;

4. The final 30 credits presented for the additional degree must be in addition to and independent of any previous baccalaureate;

5. A minimum of 15 credits must be taken through Continuing Studies in the major field that is presented for the additional degree; and

6. A minimum of 30 semester credits must be completed through Continuing Studies (unless University of Massachusetts Lowell day classes are authorized).

Candidates for the additional bachelor's degree must earn a minimum of 30 credits and must comply with any special college regulation concerning completion at the University of major field and professional program requirements (including collateral and prerequisite course requirements for the major/professional program). Second degree candidates may be eligible for major field honors but are not eligible for University honors unless they have completed 60 credits at the University for the additional bachelor's degree.

Day Programs for Students Matriculating for Continuing Studies, Corporate and Distance Education

Students who have established matriculation for University of Massachusetts Lowell Continuing Studies degrees at either the associate or baccalaureate levels may be permitted to pursue specifically authorized day courses. Such students must secure the written approval of their program coordinators for all projected courses prior to filing an application with the Office of Undergraduate Admissions.

Admission into a Graduate Certificate or Degree Program

Students interested in applying into graduate degree or certificate programs should contact Graduate Admissions at (800) 656-GRAD or http://www.uml.edu/grad. Students with bachelor's degrees from accredited institutions are eligible to enroll as non-degree students for a maximum total of 12 credits (depending on the program) prior to matriculating into formal graduate degree programs. Students must formally apply to graduate certificate programs before enrolling in graduate courses intended for specific certificate programs.

Transfer Student Information

Students may transfer academic credit completed at other accredited institutions of higher education toward an undergraduate certificate, associate's degree or bachelor's degree. (Only one course may be transferred into each undergraduate certificate program.) Official transcripts must be sent to UMass Lowell's Office of Admissions.

Credit will be accepted if it is equivalent to University of Massachusetts Lowell instruction, if it is applicable to the intended program, and if the student has received a grade equivalent to a "C-" (1.7 on a 4.0 scale) or better, as shown on official transcripts of record that are received directly from other accredited institutions. An applicant who has attended one or more institutions must request each Registrar to mail directly to the University of Massachusetts Lowell a transcript of his or her record even though credits were not earned or presented for transfer. No credit will be recognized for the grade of "P" unless the catalog of the transferring institution specifically states that "P" is equivalent to a final course grade of "C-" (1.7 on a 4.0 scale). Quarter credits are recognized on a prorated basis of three quarter credits to two semester credits.

Grades of transferred courses will be recorded with the notation "CR", which designates that credit has been granted and will not be computed into a student's cumulative grade point average at the University of Massachusetts Lowell. Please note that all credits to be transferred must be identified at the time of application for transfer. The University reserves the right to deny credit for course work taken by the student prior to admission if it is identified and presented after transfer. Residency requirements are also considered when transfer credit is being evaluated.

University Restrictions Concerning Transfer Credit Recognition

Courses completed at non-public institutions that are not accredited by the major regional accrediting associations will not be credited to degree programs of the University; nor will credit be granted for courses that are unacceptable to the transfer institution for its own associate's or bachelor's programs or that are completed within post-secondary school diploma programs. Noncredit CEU courses, adult enrichment or refresher courses, and secondary school correspondence and home study courses also are not recognized for transfer credit. The University reserves the right to refuse recognition for courses that were taken more than ten years prior to the date when a student applies for transfer when, in the opinion of Department Chairpersons and Faculty Program Coordinators, the knowledge attained in such courses is deemed to be out of date and/or in need of verification. Competencies that a student has achieved through such courses, or by any other means, may be recognized for credit if verified by CLEP or departmental examinations.

Commonwealth Transfer Compact

The University of Massachusetts Lowell has affirmed its intention to maintain flexibility in the transfer of qualified students from community colleges of the Commonwealth of Massachusetts. For the implementation of this objective, the University of Massachusetts Lowell has subscribed to the Commonwealth Transfer Compact.

All courses that have been accepted by the University from signatory community colleges of the Commonwealth Transfer Compact are listed on the student's transcript; and those courses that are not applicable to specific curriculum requirements are credited, whenever possible, as unrestricted elective courses. Since some curricula of the University do not provide for such unrestricted elective courses, or the number of transferred courses may exceed the number of unrestricted elective courses that are permitted within the specifications for minimum degree requirements, transferred courses that are not applicable to the specific requirements of a curriculum are not counted in the determination of the number of course credits completed until the semester of graduation. This procedure prevents the early imposition of a grade point requirement for retention that is in excess of that specified for the number of credits completed and applicable to the student's particular curriculum.

The revised Commonwealth Transfer Compact (1990) provides a process to facilitate the transfer of collegiate credits and to ensure the appropriate recognition of academic progress earned by students at a community college who wish to continue their education at a public college or university.

Need help making sense of all this? Call our Faculty and Student Support Center at (978) 934-2474. Our team of Faculty and Student Support Specialists can help you with your questions!

A Step-by-Step Guide to Transferring International Credits

Students pursuing a degree at UMass Lowell who would like to transfer college credits earned outside the U.S. need to contact the Center for Educational Documentation (CED) to have their credits evaluated for potential transfer credit. The Center for Educational Documentation (CED) provides UMass Lowell with professional assistance in interpreting the educational background of persons educated abroad.

The information we have provided below is designed to help guide students through the process, but we strongly advise that students check directly with CED for the most up-to-date information regarding regulations, requirements, restrictions, forms and applicable fees.

Center for Educational Documentation, Inc.
PO Box 231126
Boston, MA 02123-1126
Phone: (617) 338-7171
Fax: (617) 338-7101
Email: info@cedevaluations.com
http://www.cedevaluations.com

THE PROCESS:

Applicants must submit the following by mail to the Center for Educational Documentation (CED):

1. A completed Credential Evaluation Request Form (available on CED's website).

   For UMass Lowell Continuing Studies to receive the evaluation, request that the evaluation be sent to:
   University of Massachusetts Lowell
   Dugan Hall, Room 104
   883 Broadway Street
   Lowell, MA 01854-5104

2. Documentation to support the earning of credits.

   The documents needed to prepare an evaluation depend on the purpose and use of the evaluation, but generally include:
   - Diplomas, degrees and certificates
   - Transcripts, study books, course and grade listings, or course syllabi
   - Program outlines or course descriptions as needed
   - Notice of certification (e.g., teacher, accountant)

   Original documents or legible, notarized copies of original documents showing the stamp or seal of the institution should be submitted. CED reserves the right to request original documents as needed. They should be sent to CED by certified mail. To have your documents returned by certified mail, an additional shipping and handling charge is required; please refer to the CED website for up-to-date cost and procedure.

   Translations certified by Consulate, Embassy, Notary Public or Translation Service must be provided together with the documents in the original language for documents in languages other than English.

   Evaluations are not prepared until the complete documentation and all necessary supporting material is received. If additional information is needed to supplement materials submitted, CED will contact the applicant to inform them of any additional documentation required.

3. Application fee and other fees as required.

   The fee depends on the type and complexity of the evaluation and is indicated on the CED Credential Evaluation Request Form. Please refer to CED for any applicable additional fees and fee policies.

The transcript evaluation, once completed by CED, will be mailed to the University of Massachusetts Lowell and a copy sent to the applicant. A Continuing Studies Program Coordinator then evaluates which credits will transfer and an evaluation worksheet will be sent to you.

Students Transferring from Massachusetts Community Colleges to Public Colleges and Universities Offering the Baccalaureate Degree

Section I: Requirement for Transfer Compact Status
A student shall be eligible for Transfer Compact status if he or she has met the following requirements:

a. Completed an associate's degree with a minimum of 60 credit hours exclusive of developmental course work;

b. Achieved a cumulative grade point average of not less than 2.0 (in a 4.0 system) at the community college awarding the degree; and

c. Completed the following minimum General Education core, exclusive of developmental course work:

English Composition/Writing	6 cr
Behavioral and Social Sciences	9 cr
Humanities and Fine Arts	9 cr
Natural or Physical Science	8 cr
Mathematics	3 cr

The sending institution is responsible for identifying the transcript of each student who is a candidate for transfer under this compact.

Section II: Credits to be Transferred
The 35 credits in General Education specified in Section I will be applied toward the fulfillment of the receiving institution's General Education requirements.

A minimum of 25 additional credits will be accepted as transfer credits by the receiving institution. These credits may be transferred 1) as free electives, 2) toward the receiving institution's additional General Education requirements, 3) toward the student's major, or 4) as any combination as the receiving institution deems appropriate.

Only college-level course credits consistent with the standards set forth in the Undergraduate Experience recommendations are included under this Compact. Credits awarded by the sending institution through CLEP, challenge examinations and other life-experience evaluations for course credit may be included when the community college certifies that a student qualifies under this Compact.

Section III: Credits Beyond the Associate's Degree
To complete the baccalaureate degree, a student who transfers under this Compact may be required to take no more than 68 additional credits unless:

a. The student changes his or her program upon entering the receiving institution; or

b. The combination of additional General Education requirements, if any, and the requirements of the student's major at the receiving institution total more than 68 credits.

Under these circumstances, transfer students will be subject to the same requirements as native students. The term "native student" refers to students who began their undergraduate education at the baccalaureate institution.

Depending upon the date of matriculation into a degree program through Continuing Studies at the University of Massachusetts Lowell, each student is responsible for satisfying either the following General Education 2000 Program Requirements or the University Core Requirements on page 51.

GENERAL EDUCATION 2000 PROGRAM REQUIREMENTS

For students who matriculated into a degree program since the Fall 2005 semester.

The General Education Program at UMass Lowell fosters active learning by asking students to think critically, communicate effectively and embrace cultural diversity.

Courses within the program are designed to provide students with a foundation that prepares them for continued work within their major and minor fields, as well as endowing them with the intellectual habits that will enable them to become lifelong learners.

There are two major components to the General Education Program:

1) Breadth of Knowledge, which consists of a year of college writing; a semester of mathematics courses; and three courses in each of three areas: Arts and Humanities, Social Sciences, and Science and Technology; and

2) General Education courses within a major, which are defined differently in each major field, but meet the University's Diversity and Ethics requirements.

Course Requirements

The General Education Program consists of two parts: a course distribution requirement and requirements to be fulfilled through the student's major program. Seven learning outcomes are to be addressed by the General Education Program. They are:

1 Breadth of Knowledge
2. Critical Thinking
3. Clear Communication
4. Diversity
5. Ethics
6. Self-Direction and Collaboration
7. Information Literacy

The first three learning outcomes should be fulfilled through the course distribution requirement; the remaining four learning outcomes should be fulfilled through courses provided by the major department. Learning outcomes 2) and 3), which are central to the course distribution requirement, are also reinforced throughout the student's major program. Ideally, all seven learning goals will eventually become embedded in the curriculum as a whole. Thus a student's first exposure to a particular goal may be in General Education courses, but students may find the principles behind these goals reinforced repeatedly throughout their undergraduate experience.

General Education Course Distribution Requirements

The Course Distribution Requirement consists of a total of 36-38 credits and address three of the learning outcomes:

Breadth of Knowledge (learning outcome #1)

Students must demonstrate familiarity with several different areas of knowledge and several different modes of inquiry (outside of their major program). This requirement consists of five categories of courses. All courses in categories c), d), and e) must be chosen from an approved list and no more than two may be from the same department:

a) College Writing I & II
b) Mathematics — 1 course (provided by the Math department)
c) Arts and Humanities — 3 courses
d) Social Sciences — 3 courses
e) Science and Technology — 3 courses (2 must contain an experimental learning component)

Total: 36-38 credits

Each General Education course in the distribution requirement provides elements of:

Critical Thinking (learning outcome # 2)

Students must demonstrate the ability to synthesize information, discover connections, differentiate between facts and opinions,

assess evidence, draw conclusions, construct arguments on both sides of a debate using the best available evidence, solve problems, develop and test hypotheses.

Clear Communication (learning outcome # 3)

Students must demonstrate the ability to communicate effectively: to articulate, support and defend a position using appropriate modes of communication.

Major Program General Education Requirements

Each major program provides appropriate ways for its students to address the learning outcomes 4-7. The major programs have developed plans for complying with their part of the General Education Program in consultation with the General Education Coordinating Committee.

Diversity (learning outcome # 4)

Students must demonstrate the ability to understand diverse groups of peoples, cultures and views. Diversity is defined broadly to include culture (i.e., national origin, language, ethnicity and religion), race, gender, social class, age, sexual orientation and disability).

This learning outcome should be met by each student's selection of at least one General Education course, major course (or sections of courses) or elective that meets the criteria for significant diversity content. Courses that fulfill the diversity requirement may also count toward other requirements of General Education and the major.

Ethics (learning outcome # 5)

Students must demonstrate an awareness of the implications of choosing various principles of action. This learning outcome should be met by each student's selection of a General Education course, major course, or elective with significant ethics content. Courses that fulfill the ethics requirement may also count toward other requirements of General Education and the major.

Self-Direction and Collaboration (learning outcome # 6)

Students must demonstrate the ability to complete an intellectual project, both independently and in collaboration with others. Major programs may choose to meet this learning outcome by requiring a capstone project, a directed study or a portfolio of learning experience.

Information Literacy (learning outcome # 7)

Students must demonstrate the ability both to use appropriate media to gather information relative to their major field and to access reliable general information.

Courses Approved for General Education 2000 Program as of January 2007

See www.uml.edu/gened for the most up-to-date listing of courses approved for the General Education 2000 Program.

Note: Courses followed by D or E have been approved for the Diversity or Ethics standards.

Arts and Humanities (AH)

English:
Great Books of Antiquity, 42.201
Great Books Modern, 42.202
Human Values in Western Culture I, 42/59.205 (D, E)
Human Values in Western Culture II, 42/59.206 (D, E)
Poetry, 42.211
Short Story, 42.212
Monsters, Apes, and Nightmares, 42.216 (E)
Horror Story, 42.217
Introduction to Theatre, 42/59.219
Oral Communication, 42.222
Turning Fiction into Film, 42.232
Literature and Women, 42.240
Contemporary Women Writers, 42.243 (D)
Women in the Middle Ages and Renaissance, 42.244
Gay and Lesbian Literature, 42.245 (D)
Values in American Culture, 40/42.248 (D, E)
(also listed as 59.248)
Literature on Technology and Human Values, 42/59.249 (E)
The Bible as Literature, 42.250
War in Literature, 42.251 (E)
The Family in American Literature, 40/42.257 (D)
Acting I, 42.261 (also 59.261)
Introduction to Shakespeare, 42.267
Continental Fiction in Translation, 42.272
Literature of the Beat Movement, 42.274
Crime and Literature, 42.285 (D)
History of English Literature I, 42.291
History of English Literature II, 42.292
History of English Literature III, 42.293
History of American Literature I, 42.294
History of American Literature II, 42.295

Arts and Humanities (AH) - continued

History of American Literature III, 42.296 (D)
The South in American Literature, 42.311 (D)
Studies in Film, 42.341
Arthurian Literature: Love, War, and Magic, 42.349
African American Literature, 42.376 (D)

History:
Classical Civilization, 43.101
Western Civilization I, 43.105 (D)
Modern World, 43.106 (D)
United States to 1877, 43.111 (D)
American Civilization since 1877, 43.112 (D)
American Economic History, 43.206 (D)
The Middle Ages, 43.227 (D)
Women in European History, 43.228
History of Crime and Social Control, 43.306 (D)
African American History, 43.275 (D)
European Social and Economic History, 43.304
History of Science I: The Invention of Science, 43.311
Science in the Modern World, 43.312 (E)
American Environmental History, 43.316
Problems of Modern Ireland, 43.336 (D)
Slavery and Abolition, 43.345 (D)
Colonial America: History and Culture, 43.350 (D)

Philosophy:
Introduction to Philosophy, 45.201 (E)
Introduction to Logic and Critical Reasoning, 45.202 (E)
Introduction to Ethics, 45.203 (D, E)
Introduction to Political Pholosophy, 45.206 (E)
Ancient Philosophy, 45.285 (E)
Ways of Knowing, 45.301
God and Philosophy, 45.304 (D)
Language, Signs and Symbols, 45.305
Philosophy and Film, 45.316
Environmental Philosophy, 45.327 (D, E)
Engineering and Ethics, 45.334 (E)
Ethical Issues in Technology, 45.335 (E)
Early Modern Philosophy, 45.336 (E)
Mysticism: East and West, 45.340 (D, E)
Science, Ethics, and Society, 45.341 (E)
Critical Theory & Society, 45.342 (E)
Eastern Philosophy and Religion, 45.348 (D,E)
World Philosophies, 45.350 (D, E)
Problem of Evil, 45.351 (D, E)
Existence and Anxiety, 45.352 (E)
Philosophies of Art and Beauty, 45.384
Bioethics and Genetic Research, 45.401 (E)

Cultural Studies:
Gender and Sexuality in French Cinema, 50.375 (D)
French Cinema and Society, 50.376 (D)
Images of Women in French Cinema, 50.378 (D)

Art History:
Art Appreciation, 58.101 (D)
History of Art I, 58.203 (D)
History of Art II, 58.204 (D)
History of Architecture, 58.206
Nineteenth Century Art, 58.211
Twentieth Century Art, 58.221
Greek and Roman Art and Architecture, 58.231
American Art and Architecture, 17th-19th Centuries, 58.313
Italian Renaissance Art, 58.321
Italian Mannerism, 58.330
Italian Baroque Art, 58.332
Women and Art, 58.340
Art History and Film, 58.370

Music:
Basic Music Theory, 71.110
Gender Issues in Music, 74.103 (D)
Music in Western Civilization, 74.161
Music History I, 74.261
Music History II, 74.262
American Music, 74.301 (D)
African-American Concert Music, 74.320 (D)
Jazz, 74.355 (D)
History of Rock Music, 74.386 (D)
American Musical Theater, 74.356 (D)
Music, Technology and Society, 78.301

Interdisciplinary Programs:
Introduction to Gender Studies, 59.240 (D,E)
Acting I, 59.261
Understanding Technological Risk, 59.303 (E)
European Cinema: Across Cultures, 59.374
Computers in Society, 59.395 (E)

Social Sciences (SS)

Nursing:
Introduction to Gerontology, 30.306

Legal Studies:
Introduction to Business Law, 41.262
Legal Issues Involving Racism, 41.360 (D)

Criminal Justice:
Gender, Race, and Crime, 44.360 (D)
Intimate Partner Violence, 44.477
Child Maltreatment, 44.478 (E)

Political Science:
Introduction to American Politics, 46.101
Introduction to Politics, 46.110 (D)
Comparative Political Systems, 46.112 (D)
Introduction to International Relations, 46.121 (D)
Constitutional Law and Politics (and honors section), 46.235 (D)
Civil Liberties Law and Politics (and honors section), 46.237 (D)
Literature, Politics and Genocide in Cambodia, 46.348 (D, E)

Psychology:
General Psychology, 47.101
Social Psychology, 47.209 (D)
Psychology of Personality, 47.232
Community Psychology, 47.255 (D)
Child and Adolescent Development , 47.260
Abnormal Psychology, 47.272
Theories of Learning, 47.276
Psychology of Consciousness, 47.333
Psychology of Women, 47.335 (D)
Human Sexuality, 47.351
Sport and Exercise Psychology, 47.355

Human Development II, 47.360
Introduction to Development Disabilities, 47.363 (D)
Psychology of Language, 47.365 (D)

Sociology:
Introduction to Sociology, 48.101 (D, E)
Social Anthropology, 48.102 (D)
Introduction to Social Values, 48.110 (D, E)
Peacemaking Alternatives, 48.215 (D, E)
Sociology of the Family, 48.231 (D)
Introduction to Gender Studies, 48.240 (D)
Sociology of Deviance, 48.255
Sociology of the Mass Media, 48.260 (D, E)
Self in Society, 48.270
Sociology of Genocide, 48.317 (D, E)
Social Stratification, 48.341 (D)
Women in Society, 48.370 (D)

Economics:
The Future of Work in the Global Economy, 49.110
Economics I, 49.201
Macroeconomics, 49.202
Labor Economics, 49.302 (D)
Introduction to Environmental Economics, 49.315 (SSE)
U.S. Economic History, 49.325 (D)
Health Economics, 49.345 (E)

Regional Economic and Social Development:
Introduction to Regions, 57.201
Sustainable Development, 57.211 (E)
Regional Health and the Environment, 57.218 (D)
Gender, Work, and Public Policy (sr. status req.), 57.420 (D)

Environmental, Earth and Atmospheric Sciences:
World Regional Geography, 88.101 (D)
Geography of the US and Canada, 88.102
Foundations of Conservation and Environmental Concern, 88.104 (E)

Interdisciplinary Programs
Introduction to Gender Studies, 59.239 (D,E)
Cultural, Social and Value Issues in American Universities, 59.380 (E)

Science (SC) and Technology (TN)

No more than one technology (TN) or technology and lab (TNL) course may be used to satisfy this standard. At least two of the three Science and Technology courses must include lab. (Definitions: SCL or TNL: Lab is corequisite; students must take both lecture and lab to satisfy general education standard. SCLO or TNLO: Students may take lecture and lab together to satisfy SCL standard or lecture without lab for SC credit)

Engineering:
Technology and the Human-Built World, 10.101 (TN)
Digital Information World, 16.111 (TNL)
Principles and History of Radio, 16.233 (TNL)
Artbotics, 91.117 (TNL)

Clinical Laboratory Sciences:
Human Anatomy and Physiology 1, 35.101/103 (SCL)
Human Anatomy and Physiology 2, 35.102/104 (SCL)

Biology:
Principles of Biology I with Lab, 81.111/113 (SCL)
Principles of Biology II with Lab, 81.112/114 (SCL)
Principles of Ecology with Lab, 81.315/317 (SCL)
Population Genetics and Evolution, 81.435 (SC)
Life Science I (and Lab), 83.101/(103) (SCLO)
Life Science II (and Lab), 83.102/(104) (SCLO)
Nutrition and Disease, 83.123 (SC)
Plants and Human Society, 83.125/127 (SCLO)

Chemistry:
Applied Chemistry for Non-Scientists, 84.101 (SCL)
General Chemistry I with Lab, 84.111/113 (SCL)
General Chemistry II with Lab, 84.112/114 (SCL)
Chemistry I with Lab, 84.121/123 (SCL)
Chemistry II with Lab, 84.122/124 (SCL)
Honors Chemistry I, 84.135 (SCLO)
Honors Chemistry II, 84.136 (SCLO)

Environmental, Earth and Atmospheric Sciences:
The Nature of Science, 85.120 (SC)
Weather and Climate and Lab, 85.141 (SCL)
Astronomy and Lab, 87.115/117 (SCL)
General Geology, 89.101 (SC)
Earth and Life, 89.151/153 (SCL)
Forensic Geology (honors), 89.215 (SCL)

Physics:
Introductory Physics I (and Lab), 95.101/96.101 (SCL)
General Physics I (and Lab), 95.103/(96.103) (SCLO)
Exploring the Universe and Lab, 95.121/96.121 (SCL)
Physics I and Lab, 95.141/96.141 (SCL)
Honors Physics I (and Lab), 95.161/(96.161) (SCLO)
Radiation and Life (and Lab), 99.101/102 (SCLO)

GENERAL EDUCATION/UNIVERSITY CORE REQUIREMENTS

For students who enrolled in an associate's or bachelor's degree program prior to the Fall 2005 semester.

Students who enrolled in an associate's or bachelor's degree program prior to the Fall 1994 semester should call the Faculty and Student Support Center at (978) 934-2474 for guidance on course selection.

All students are required to satisfy the General Education Requirements, which include a minimum of 36 credits. In fulfilling the following requirements (except Sciences), students may take no more than one course from a single department. The two-course College Writing requirement is a separate service of the English Department and does not affect that Department's participation in other categories of General Education.

Courses taken to fulfill the General Education Requirements cannot be taken on a Pass/Fail basis. Students who transfer to the University from quarter-hour schools may satisfy the number and types of courses required under General Education but could fall short of the 36-credit requirement. To meet this minimum General Education credit requirement, these students may take or transfer additional courses from any of the following eight categories.

General Education requirements must be satisfied as follows:

A. Aesthetics: One three-credit course designated AE, BSA, or HSA.

B. Behavioral and Social Sciences: Two three-credit courses designated BS, BSA, BSV.

C. College Writing: Two three-credit courses designated CW are required: 42.101 and 42.102 or 42.103 and 42.104.

D. Historical Studies: One three-credit course designated HS, HSA, or HSV.

E. Literature: One three-credit course designated LT or LTV.

F. Mathematics: One three-credit course designated MA in the 92 series at the level of 92.111 (Mathematical Perspectives) or higher.

G. Sciences and Technology: A minimum of three courses totaling a minimum of nine credit hours in courses designated SC, SCV, SL, ST, STL in the Continuing Studies Course Bulletin must be earned, with at least two courses that include some form of experimental learning (SL or STL).

   Students electing courses to satisfy the experimental requirement with an SL or STL course that has a separate corequisite laboratory section must pass both. Although laboratory sections may be offered as separate corequisite sections of a course and carry credit: 1.) laboratory credit will not be recognized toward fulfilling the General Education requirement unless the corequisite lecture course has been passed; and 2.) corequisite laboratory sections do not count towards meeting the three-course minimum.

   No more than two courses may be taken in a single department.

H. Values, Concepts, and Choice: One three-credit course designated VC, BSV, HSV, LTV, SCV.

General Education Codes:

AE	Aesthetics	MA	Mathematics
BS	Behavioral and Social Sciences	SC	Science
BSA	BS or AE	SL	Science with experimental learning
BSV	BS or VC	ST	Science Technology
CW	College Writing	STL	Science Technology with experimental learning
HS	Historical Studies	VC	Values, Concepts, and Choice
HSA	HS or AE	VCA	Values, Concepts, Choice, and Aesthetics
HSV	HS or VC		
LT	Literature		
LTV	LT or VC		

Courses designated BSA, BSV, HSA, HSV, LTV, and SCV encompass two General Education areas. They may be used to fulfill only one General Education requirement. For example, a course designated HSA may be used to satisfy either the Historical Studies (HS) or Aesthetics (AE) requirement, and a course designated LTV may be used to satisfy either the Literature (LT) or Values, Concepts, and Choice (VC) requirement.

GRADUATION

See the commencement website at www.uml.edu/academicaffairs/commencement for more information.

Awarding of Degrees

The University awards degrees three times a year:

1. For students completing degree requirements during the Spring, the degrees are awarded in June and diplomas are available to students in June;

2. For students completing degree requirements during the Fall semester, the degrees are awarded in February and the diplomas are available to students in March; and

3. For students completing degree requirements during the Summer term, the degrees are awarded in October and the diplomas are available to students in December.

Individuals who wish to submit verification of degree completion to employers or to graduate schools during the period between the end of their final grading period and the conferring of degrees may obtain a letter of completion.

Graduation Interview

Students anticipating graduation in the coming academic year must arrange for a graduation interview through Continuing Studies. The purpose of this interview is to determine eligibility for graduation and to begin the ordering process for the diploma. During this interview, degree candidates must identify such problems as missing courses or any problems with grades, incompletes or transfer credits. Students are encouraged to meet with their Faculty Program Coordinator prior to scheduling a graduation interview.

Students who expect to complete their degree requirements in the Fall semester must complete the interview by the end of October, and students who expect to complete their degree requirements in the Spring or Summer semesters must complete their interview by mid-March, to ensure that their names are included in the graduation program and that their diplomas are available at graduation time. Appointments are scheduled by calling the Faculty and Student Support Center at (978) 934-2474.

University Honors

The University awards degrees with three levels of distinction upon those graduating students who have attained exceptional scholastic distinction. Three levels of distinction are noted at commencement: summa cum laude, magna cum laude and cum laude. University honors are officially entered on the permanent record of students. To graduate with honors, a student must have achieved a minimum grade point average of 3.25 for all courses completed at the University and must have earned a minimum of 60 semester credits at the University as an upper-class student. A total of nine (9) credits of departmental exam and/or courses graded "S" may be used toward the 60 credits needed to be considered for University Honors. Credits taken on a Pass/Fail basis may not be counted toward the 60 credit requirement.

Three levels of distinction are noted at commencement:

Summa Cum Laude	3.850 – 4.0
Magna Cum Laude	3.500 – 3.849
Cum Laude	3.250 – 3.499

University Commencement

Graduation exercises are held once a year in early June. Undergraduates who have completed requirements during the preceding Fall semester, who complete degree requirements during the current Spring semester, and who anticipate completion of degree requirements during the next immediate Summer term are encouraged to attend commencement exercises, and their names are listed in the commencement booklet.

Graduation Checklist

- October:
  - ☆ Complete graduation interview for Fall graduates. Information is available at http://continuinged.uml.edu/policies/graduation.htm
- March:
  - ☆ Complete graduation interview for Spring and Summer graduates. Information is available at http://continuinged.uml.edu/policies/graduation.htm
  - ☆ Complete Chancellor's Medals application
- Beginning of April:
  - ☆ Pay all outstanding financial obligations
- Beginning of May:
  - ☆ Pick up cap and gown and commencement tickets at bookstore
  - ☆ Alpha Sigma Lambda members pick up academic cord at the Faculty and Student Support Office, Southwick 202, UML North, One University Ave., Lowell MA, 01854
- Mid May:
  - ☆ Senior Week activities take place
  - ☆ Senior Brunch takes place
- Beginning of June:
  - ☆ Graduation ceremony takes place
- Mid June:
  - ☆ Students not attending graduation ceremony will receive notification to pick up diploma
  - ☆ More Information available is at http://continuinged.uml.edu/policies/graduation.htm

This section of the catalog provides the programs of study required to complete degrees offered through the College of Arts and Sciences, the Francis College of Engineering and the College of Management.

All of the academic majors and options are listed within each College. Each curriculum outline consists of a suggested program of study. Students may vary from this suggested sequence by taking fewer or more courses each semester, or by taking courses during the Summer and Winter sessions. Although students have some flexibility in scheduling courses, they should adhere to the appropriate course prerequisites.

part-time associate's and bachelor's degree programs

Curriculum Outlines

College of Arts & Sciences

- B.L.A. - Bachelor of Liberal Arts
- B.A. in Psychology
- B.S. in Criminal Justice
- B.S. in Criminal Justice: Paralegal Option
- A.S. in Information Technology
- B.S. in Information Technology
- B.S. in Information Technology: Business Minor
- Second Degree Option: B.S. in Information Technology
- B.S. in Mathematics
- B.S. in Applied Mathematics
- B.S. in Mathematics: Statistics Concentration
- B.S. in Mathematics: Teacher Concentration

Francis College of Engineering

- A.S. in Civil Engineering Technology
- A.S. in Civil Engineering Technology: Surveying Option
- B.S. in Civil Engineering Technology
- A.S. in Electronic Engineering Technology
- B.S. in Electronic Engineering Technology
- A.S. in Mechanical Engineering Technology
- B.S. in Mechanical Engineering Technology

College of Management

- A.S. in Management
- B.S.B.A. - Bachelor of Science in Business Administration

College of Arts and Sciences

THE COLLEGE OF ARTS AND SCIENCES OFFERS THE FOLLOWING CONTINUING STUDIES UNDERGRADUATE PROGRAMS:

ASSOCIATE'S AND BACHELOR'S DEGREES:
Liberal Arts, B.L.A.
Psychology, B.A.
Information Technology, A.S., B.S.
Second B.S. Degree in Information Technology
Criminal Justice, B.S.
  Paralegal Option, B.S.
Mathematics, B.S.
  Statistical Concentration
  Teacher Concentration
Applied Mathematics, B.S.

CERTIFICATE PROGRAMS:
Database Management Technologies
Contemporary Communications
Data/Telecommunications
Graphic Design & Digital Imaging
Information Technology
Multimedia Applications
Paralegal Studies
Security Management and Homeland
  Security
Spanish and Latin American
Technical Writing
UNIX
Website Design & Development

FOR MORE INFORMATION ON CERTIFICATE PROGRAM DESCRIPTIONS AND REQUIREMENTS, SEE THE CERTIFICATE PROGRAMS SECTION IN THIS CATALOG OR VISIT OUR WEBSITE AT HTTP://CONTINUINGED.UML.EDU

Liberal Arts

The Bachelor of Liberal Arts degree provides students with a well-balanced liberal arts curriculum, while offering them the opportunity to pursue in-depth study in two areas of concentration. Concentrations available through Continuing Studies are Art History, English, History, Legal Studies, Psychology and Women's Studies. Other concentrations may be available with consultation with the Program Coordinator. The convenience and flexibility of this program make it an ideal choice for working adults, transfer students and for students whose education plans were previously interrupted. The program is also popular among students who plan to eventually attend graduate school, and those interested in multicultural studies, museum and archival studies, and positions within nonprofit organizations and government. This program can be taken entirely online, entirely face-to-face or as a mix of online and on-campus courses. For students entering the program in or after September 2006, the minimum required grade point average for the student graduating from the program is 2.5.

BACHELOR OF LIBERAL ARTS - Available on campus or online

TOTAL CREDITS: 120

This degree consists of 48-60 credits with concentrations in two liberal arts disciplines – see the next two pages for descriptions of the available concentrations. The minimum 48 credits must be equally divided in course work between the two concentrations – in other words, at least 8 courses (24 credits) from each concentration, with at least four of the courses from each concentration area – taken at the 300/400 level.

FIRST YEAR

FIRST SEMESTER

42.101	College Writing I - GenEd	3
- -.- - -	Mathematics Course - General Education	3
		6

SECOND SEMESTER

42.102	College Writing II - GenEd	3
- -.- - -	General Education - Social Sciences (SS)	3
		6

THIRD SEMESTER

- -.- - -	General Education - Science w/Lab	4
- -.- - -	General Education - Art & Humanities (AH)	3
		7

SECOND YEAR

FIRST SEMESTER

- -.- - -	Competency Requirement	3
- -.- - -	Concentration I Elective	3
		6

SECOND SEMESTER

- -.- - -	Competency Requirement	3
- -.- - -	Concentration II Elective	3
		6

THIRD SEMESTER

- -.- - -	General Education - Science w/Lab	4
- -.- - -	General Education - Art & Humanities (AH)	3
		7

THIRD YEAR

FIRST SEMESTER

- -.- - -	Concentration I Elective	3
- -.- - -	General Education - Social Sciences (SS)	3
		6

SECOND SEMESTER

- -.- - -	Concentration II Elective	3
- -.- - -	Competency Requirement	3
		6

THIRD SEMESTER

- -.- - -	Competency Requirement	3
- -.- - -	Free Elective	3
		6

FOURTH YEAR

FIRST SEMESTER

- -.- - -	Concentration I Elective	3
- -.- - -	Concentration II Elective	3
		6

SECOND SEMESTER

- -.- - -	Concentration I Elective	3
- -.- - -	Concentration II Elective	3
		6

THIRD SEMESTER

- -.- - -	General Education - Science (Non-Lab)	3
- -.- - -	Free Elective	3
		6

FIFTH YEAR

FIRST SEMESTER

- -.- - -	300/400 Concentration I Elective	3
- -.- - -	300/400 Concentration II Elective	3
		6

SECOND SEMESTER

- -.- - -	300/400 Concentration I Elective	3
- -.- - -	300/400 Concentration II Elective	3
		6

THIRD SEMESTER

- -.- - -	General Education - Art & Humanities (AH)	3
- -.- - -	General Education - Social Sciences (SS)	3
		6

SIXTH YEAR

FIRST SEMESTER

- -.- - -	300/400 Concentration I Elective	3
- -.- - -	300/400 Concentration II Elective	3
		6

SECOND SEMESTER

- -.- - -	300/400 Concentration I Elective	3
- -.- - -	300/400 Concentration II Elective	3
		6

THIRD SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Free Elective	3
		6

SEVENTH YEAR

FIRST SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Free Elective	3
		6

SECOND SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Free Elective	3
		6

COMPETENCY REQUIREMENT

Competency Requirement assures that students will gain necessary abilities in one of the areas deemed to be important to working in the 21st Century. Students may fulfill this requirement by choosing one of the areas below and fulfilling the requirements as stated. Students who choose the foreign language competency must complete all 12 credits within that area. Students who choose one of the other competencies may, with permission of the Program Coordinator, complete 12 "competency" credits.

I. Foreign Languages: Four courses in language and civilization (12 credits) or intermediate level proficiency.

II. Practical and Technical Literacy: Four courses (12 credits). For example: courses in computer literacy, studio art, community service, healthcare, marketing and management skills, music performance.

III. Diversity of Cultural Experience: courses in art history, music history, philosophy, history.

BACHELOR OF LIBERAL ARTS

Continued

CONCENTRATION AREAS FOR THE BACHELOR OF LIBERAL ARTS DEGREE

Students are required to take 8-10 courses from each of their two concentrations (48-60 credits total). At least four of the required courses from each concentration must be taken at the 300/400 level. Students are encouraged to discuss their concentration and course selections with their Faculty Program Coordinator.

ART HISTORY CONCENTRATION

The Art History Concentration provides students with an academic foundation appropriate for pursuing a career in the arts. Graduates of the program enjoy a wide-range of professional opportunities in institutions such as museums, art galleries, publishing companies and auction houses – working in such positions as museum curators, art librarians, antiques dealers, teachers, and art columnists to name a few. The primary focus of the Art History Concentration is to create visually literate students with a fundamental understanding of the historical development of art in societies and cultures around the world. Students pursuing this concentration will further develop the ability to organize their perceptions and thoughts about artwork so that they can provide a well-informed analysis that honors the historical and cultural context of the artwork. They learn how to use professional skills and methods in their visual analysis and how to better articulate their personal interpretation of the artwork.

Some of the courses that may be included in the Art History Concentration are:

58.101 Art Appreciation
58.203 History of Art I: Prehistoric to Medieval Art
58.204 History of Art II: Renaissance to Modern
58.221 Twentieth Century Art
58.300 Art History, Music and Culture
58.321 Italian Renaissance Art
58.330 Italian Mannerist Art
58.340 Women and Art
58.345 Pre-Raphaelite Art

A more comprehensive list of 58.- - - Art History courses is available in each semester's course bulletin or on our website.

ENGLISH CONCENTRATION

The English Concentration provides students with a comprehensive foundation in English – from learning how to write and present information in a factual and engaging manner, to studying classic and contemporary works of English and American literature. The English Department at UMass Lowell has built an extraordinary program of study designed to give students the tools they need to succeed in a variety of professions. Graduates of the program pursue careers in fields that draw upon liberal arts training including journalism, marketing, publishing, communications, library science, museum management, theatre arts, documentary filmmaking, politics, government and the law. Whether creatively or technically inclined, students pursuing the English Concentration have the opportunity to develop a clear, professional writing style – a talent that is highly regarded in virtually every industry today.

Some of the courses that may be included in the English Concentration are:

42.202 Great Books of the Modern Period
42.211 Intro to Poetry
42.212 Short Story
42.216 Monster, Apes & Nightmares
42.217 Horror Story
42.225 Business Writing OR
42.226 Technical and Scientific Writing
42.243 Contemporary Women Writers
42.300 Introduction to Journalism
42.303 Creative Writing Poetry
42.314 Writing Mysteries
42.325 Rise of the Novel
42.376 Contemporary American Fiction

A more comprehensive list of 42.- - - English courses is available in each semester's course bulletin or on our website.

HISTORY CONCENTRATION

The History Concentration provides students with a deep understanding of world history and the impact historical events have had on the world in which we live today. Courses in this concentration provide students with practical experiences in research, analysis, writing, presentation, theory and critical thinking. As a result, students graduate from the program better prepared for careers in areas such as documentary film-making, international business, library science, museum management, journalism, politics, government and the law. The History Department at UMass Lowell offers a wide range of history courses that boast topics that are highly relevant to modern times. Courses feature titles such as Problems of Modern Ireland to the History of the Middle East. Students gain a better understanding of world history, its cultures and patterns that have influenced historical development and continue to impact societies on a global scale.

Some of the courses that may be included in the History Concentration are:

43.107 World History I
43.108 World History II
43.112 U.S. History Since 1877
43.242 The Second World War
43.270 Women in American History
43.274 Native American History
43.308 History of Crime & Social Control
43.336 Problems of Modern Ireland
43.356 Civil War and Reconstruction
43.393 History of the Middle East

A more comprehensive list of 43.- - - History courses is available in each semester's course bulletin or on our website.

BACHELOR OF LIBERAL ARTS

Continued

Choose Two Concentrations From These Six Concentration Areas.

LEGAL STUDIES CONCENTRATION

The Legal Studies Concentration allows students to gain extensive insight into today's legal system – providing graduates with a wide-range of professional opportunities in the industry. The Legal Studies Concentration enables students to gain a broad-based understanding of legal practices while they work towards a solid foundation in liberal arts. Students have the opportunity to study a variety of legal topics including criminal and tort law, contract law, corporate law (partnerships, limited partnerships, joint ventures, and corporate structure), family law (marriage, custody, adoption, divorce, child support, juveniles, right to die, reproduction control, surrogate parenting and fetal tissue transfer), environmental law (federal and state legislation and public-interest litigation), racial discrimination, and real estate law (deeds, title examinations, methods of co-ownership and landlord and tenant rights and liabilities). Many of the courses in this concentration provide students with a preview to classes offered in law school.

Some of the courses that may be included in the Legal Studies Concentration are:

41.262 Introduction to Business Law
41.360 Legal Issues in Racism
41.363 Corporate and Property Law
41.367 Environmental Law
41.370 Real Estate Law
41.376 Family Law
41.381 Women and the Law
41.387 Legal Research Methods
41.490 Legal Aspects of Cyberspace

A more comprehensive list of 41.- - - Legal Studies courses is available in each semester's course bulletin or on our website.

PSYCHOLOGY CONCENTRATION

The Psychology Concentration is designed to acquaint students with the science that surrounds the human mind. Courses in this concentration cover such topics as human development, the learning process, sexuality, the relationship between physiological and psychological processes in humans and animals, sensation and perception, cognitive processes, motivation and emotion, personality, behavioral disorders, and social behavior. Graduates of the program can pursue careers in psychology-related fields such as social work, mental health care, human services, counseling, marketing research, labor relations, management and productivity improvement. For those who wish to become a licensed psychologist, an advance degree is typically required, yet the Psychology Concentration provides students with an academic foundation that is conducive to further pursuit of an advanced degree in this field.

Some of the courses that may be included in the Psychology Concentration are:

47.101 General Psychology
47.260 Child and Adolescent Development
47.272 Abnormal Psychology
47.312 Learning and Behavior
47.335 Psychology and Women
47.351 Human Sexuality
47.360 Adult Development & Aging
47.363 Intro to Disabilities Studies
47.477 Seminar: Contemporary Trends – Addictions

A more comprehensive list of 47.- - - Psychology courses is available in each semester's course bulletin or on our website.

WOMEN'S STUDIES CONCENTRATION

The Women's Studies Concentration explores the history of women in societies throughout the world – providing students with an understanding of how social and cultural influences have shaped the lives and roles of women throughout history. For graduates, there is a growing demand in the workforce for experts on gender issues. In fact, women's studies specialists are increasingly being used as consultants in both the public and private sector. Graduates of this concentration receive all the benefits of a well-rounded liberal arts education, plus advanced knowledge of issues particularly affecting women in the workplace today.

Note: The following list includes courses from some of the other concentration areas, but they may only be counted once towards one of the two concentration areas.

41.376 Family Law
41.381 Women and the Law
42.241 Women in Film
42.243 Contemporary Women Writers
43.270 Women in American History
43.380 Work and Society
44.360 Gender, Race, and Crime
44.477 Intimate Partner Violence
47.335 Psychology and Women
47.351 Human Sexuality
48.231 Sociology of the Family
48.370 Women in Society
48.305 Sociology of Family Law
50.378 Women in French Cinema
58.340 Women & Art

Psychology

The Bachelor's Degree in Psychology is one of UMass Lowell's most popular degree programs for students who are interested in social and behavioral sciences. This program can be taken entirely online or as a mix of online and on-campus classes.

The Psychology curriculum acquaints students with scientific methods and psychological studies. It provides students with theoretical foundations in various subfields of psychology: experimental, developmental, social, personality and clinical psychology. The curriculum emphasizes the application of psychological knowledge and skills in many areas of human functioning.

BACHELOR OF ARTS IN PSYCHOLOGY - Available on campus or online

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 120

The following course outline is only a suggested course load. Based on student experiences, we do not recommend registering for more than 3 online courses per semester.

FIRST YEAR

FIRST SEMESTER

42.101	College Writing I - GenEd	3
92.- - -	General Education - Mathematics (92.151/111/183 or 92.283 recommended)	3 6

SECOND SEMESTER

47.101	General Psychology	3
- -.- - -	General Education - Social Science (SS)	3 6

THIRD SEMESTER

- -.- - -	Beginning Language I	3
42.102	College Writing II - GenEd	3 6

SECOND YEAR

FIRST SEMESTER

- -.- - -	General Education - Science w/Lab	4
- -.- - -	General Education - Arts/Humanities (AH)	3 7

SECOND SEMESTER

47.260	Child and Adolescent Development	3
- -.- - -	Beginning Language II	3 6

THIRD SEMESTER

47.269	Research I: Basics	3
47.232	Psychology of Personality or	3
47.272	Abnormal Psychology	6

THIRD YEAR

FIRST SEMESTER

- -.- - -	General Education - Social Science (SS)	3
- -.- - -	General Education - Science w/Lab	4 7

SECOND SEMESTER

- -.- - -	Intermediate Language I	3
47.209	Social Psychology OR	3
47.255	Community Psychology	6

THIRD SEMESTER

47.- - -	Experimental Psychology Elective (see courses on next page)	3
- -.- - -	General Education - Arts/Humanities (AH)	3 6

FOURTH YEAR

FIRST SEMESTER

- -.- - -	General Education - Science (Non-Lab)	3
- -.- - -	Intermediate Language II	3 6

SECOND SEMESTER

47.369	Research II: Statistics	3
3-.- - -	General Education - Arts/Humanities (AH)	3 6

THIRD SEMESTER

47.300/400	Psych. Elective	3
- -.- - -	General Education - Social Science (SS)	3 6

FIFTH YEAR

FIRST SEMESTER

- -.- - -	Free Elective	3
47.375	Research III: Laboratory	3 6

SECOND SEMESTER

47.300/400	Psych. Elective	3
- -.- - -	Psych. or Free Elective	3 6

THIRD SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Free Elective	3 6

SIXTH YEAR

FIRST SEMESTER

47.4 - -	Advanced Seminar (see course listings on next page)	3
- -.- - -	300/400 Psych. or Free Elective	3 6

SECOND SEMESTER

- -.- - -	300/400 Free Elective	3
- -.- - -	Free Elective	3 6

THIRD SEMESTER

- -.- - -	Free Elective	3
47.4 - -	Advanced Psych. Elective	3 6

SEVENTH YEAR

FIRST SEMESTER

- -.- - -	Psych. or Free Elective	3
- -.- - -	300/400 Free Elective	3 6

SECOND SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Free Elective	3 6

*Consult the GenEd 2000 website at www.uml.edu/gened regarding all GenEd requirements. Psychology majors fulfill GenEd Diversity and Ethics requirements by completing the major.

BACHELOR OF ARTS IN PSYCHOLOGY

Continued

GENERAL GUIDELINES FOR PSYCHOLOGY MAJOR REQUIREMENTS

(For freshmen entering Fall 2003 and subsequently)

A major in psychology consists of 36-45 credits with at least 18 credits at the 300 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the Program Coordinator regarding satisfaction of major course requirements.

Required Courses

47.101 General Psychology
47.260 Child and Adolescent Development
47.269 Research I: Basics*
47.369 Research II: Statistics
47.375 Research III: Laboratory

*Note: Students must earn a minimum grade of C in 47.269 before taking 47.369.

Choose One Course in Each of the Following Three Areas:

a. Personality and Abnormal Psychology:
47.232 Psychology of Personality
47.272 Abnormal Psychology

b. Social and Community Psychology:
47.209 Social Psychology
47.255 Community Psychology

c. Experimental Psychology:
47.273 Brain, Mind & Behavior
47.276 Theories of Learning
47.277 Sensation and Perception
47.278 Cognitive Psychology

Take Two 300/400 Level Psychology Courses:
47.300/400
47.300/400

Take One Advanced Seminar:
47.472 Seminar in Personality
47.473 Seminar in Social Psychology
47.474 Seminar: Developmental Psychology
47.475 Seminar in Clinical Psychology
47.476 Seminar: Experimental Psychology
47.477 Seminar: Contemporary Trends in Psychology
47.480 Integrative Seminar

Take One Additional 400 Level or Higher Psychology Elective:

- -.- - - Any 400 level seminar
- -.- - - Practicum (w/permission of instructor)
- -.- - - Directed Study (w/permission of Dept. Chair)
- -.- - - Graduate Level Course (Seniors w/instructor's permission)

LANGUAGE REQUIREMENT

Students in the Psychology major are required to demonstrate intermediate level proficiency in a foreign language.

Criminal Justice

The University of Massachusetts Lowell offers a Bachelor of Science Degree in Criminal Justice. This program offers a strong concentration in professional courses while simultaneously assuring the student a traditional, well-rounded liberal arts education. The typical student takes between 36 and 48 credits in professional courses.

In addition to this, the student majoring in Criminal Justice will fulfill a professional skills requirement. This consists of either attaining intermediate proficiency in a modern foreign language or completing four mathematics courses in computers. In the event the student chooses the foreign language skill, the University recommends Spanish.

BACHELOR OF SCIENCE IN CRIMINAL JUSTICE

YEARS 1-7: SUGGESTED PROGRAM OF STUDY

TOTAL CREDITS: 120

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the students' own personal time constraints. A 2.2 cumulative average overall and a 2.5 average in the major are necessary for graduation.

FIRST YEAR

FIRST SEMESTER

42.101	College Writing I	3
44.101	The Criminal Justice System	3
- -.- - -	Skills Requirement I	3
		9

SECOND SEMESTER

42.102	College Writing II	3
41.234	Criminal Law	3
- -.- - -	Skills Requirement II	3
		9

SECOND YEAR

FIRST SEMESTER

- -.- - -	General Education - Social Sciences (SS)	3
92.283	General Education - Mathematics (Introduction to Statistics) OR	3
92.283	Statistics for Behavioral Sciences (recommended)	6

SECOND SEMESTER

- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	General Education - Science*	3
		6

THIRD YEAR

FIRST SEMESTER

44.221	Criminology	3
44.- -	Criminal Justice Elective	3
- -.- - -	Criminal Justice Collateral	3
		9

SECOND SEMESTER

44.- -	Criminal Justice Elective	3
- -.- - -	Skills Requirement III	3
- -.- - -	General Education - Science*	3
		9

FOURTH YEAR

FIRST SEMESTER

- -.- - -	Skills Requirement IV	3
- -.- - -	General Education - Arts/Humanities (AH)	3
44.390	Introduction to Criminal Justice Research	3
		9

SECOND SEMESTER

- -.- - -	General Education - Arts/Humanities (AH)	3
- -.- - -	Free Elective	3
44.370	Criminal Justice Management	3
		9

FIFTH YEAR

FIRST SEMESTER

44.- -	Criminal Justice Elective	3
- -.- - -	Criminal Justice Collateral	3
- -.- - -	General Education - Arts/Humanities (AH)	3
		9

SECOND SEMESTER

44.300/400	Criminal Justice Elective	3
44.- -	Criminal Justice Elective	3
- -.- - -	Criminal Justice Collateral	3
		9

SIXTH YEAR

FIRST SEMESTER

- -.- - -	Free Elective	3
44.300/400	Criminal Justice Elective	3
- -.- - -	Criminal Justice Collateral	3
		9

SECOND SEMESTER

- -.- - -	General Education - Science*	3
44.371	Criminal Justice Planning and Evaluation	3
- -.- - -	Criminal Justice Collateral	3
		9

SEVENTH YEAR

FIRST SEMESTER

- -.- - -	Criminal Justice Collateral	3
- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	Free Elective	3
		9

SECOND SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Free Elective	3
- -.- - -	Free Elective	3
		9

*Science: three courses, nine credits minimum, with at least two courses that include some form of experimental learning.

BACHELOR OF SCIENCE IN CRIMINAL JUSTICE

Continued

CRIMINAL JUSTICE REQUIREMENTS: 36 - 48 CREDITS

The major in the Bachelor of Science in Criminal Justice consists of at least 36 credits in criminal justice courses, of which at least 15 credits should be at the 300 level or above.

COLLATERAL REQUIREMENTS: 18 CREDITS

In addition to the major courses and the professional skills area, Criminal Justice majors should select six courses from the following list of collateral courses. Six credits must be at the 300 level or above. Courses used to fulfill the professional skills requirement may be used toward fulfillment of this requirement. The collateral courses should be chosen from Legal Studies, Psychology, Political Science or Sociology. The following is a list of suggested collateral courses from which students may choose:

41.261 Introduction to Legal Concepts
41.262 Introduction to Business Law
41.363 Corporate and Property Law
41.369 The Courts and the Constitution
41.376 Family Law
41.381 Women and the Law
41.383 Alternative Dispute Resolution
42.382 Crime in Literature
43.216 American Urban History I
43.217 American Urban History II
43.268 History of the Family and Childhood in the U.S.
43.308 History of Crime, Conflict, and Social Control in the U.S.
43.349 English Constitutional and Legal History
44.435 Alternative Dispute Resolution
45.203 Introduction to Ethics
46.105 Introduction to Public Policy
46.202 Practical Public Affairs
46.230 Law and the Legal System
46.265 State and Local Politics
46.270 Legislative Politics
46.345 Constitutional Law and Politics
46.347 Civil Liberties, Law and Politics
46.355 Government Fiscal Policy
46.356 Public Policy Analysis
46.360 Public Administration
47.209 Social Psychology
47.232 Psychology of Personality
47.260 Child and Adolescent Development I
47.272 Abnormal Psychology
47.360 Human Development II
47.364 Psychology of Crime and Corrections
48.231 Sociology of the Family
48.234 Study of Minorities
48.235 Black Experience in American Life
48.255 Social Deviance
48.256 Political Sociology
48.341 Social Stratification
48.345 Urban Sociology
48.361 Sociology of Law and the Criminal Justice System
48.402 Social Research
92.283 Introduction to Statistics
92.363 Introduction to Data Analysis

All courses in the Criminal Justice major are regarded as professional courses and are not accepted either in transfer or as elective options in other degree programs in the College of Arts and Sciences, except for the following:

44.101 The Criminal Justice System
44.221 Criminology I
44.234 Criminal Law
44.261 Juvenile Delinquency
44.321 Advanced Criminology II
44.335 Juvenile Court: Philosophy and Practice Justice

PROFESSIONAL SKILLS REQUIREMENT: 12 CREDITS

Students are required to meet proficiency standards in one of the following:

a. Intermediate proficiency in a modern language, preferably Spanish OR

b. Proficiency in Criminal Justice Technology and Information Systems to be demonstrated by passing a minimum of four courses (12 credits) as follows:

44.203 CJ Technology & Information Systems
- - .- - - One of the following:
90.385 Introduction to Information Security
91.113 Exploring the Internet
44.397 Crime Mapping
44.395 Statistics in Criminal Justice
44.398 Data Analysis in Criminal Justice

PROGRAM TRACKS

There are three main areas of tracks that a student may elect: Enforcement, Law and the Courts, or Corrections. Courses suggested for one track are not exclusive, and some crossover is desirable.

Enforcement
44.101 The Criminal Justice System
44.141 Police Functions
44.221 Criminology
44.233 Criminal Procedure
44.234 Criminal Law
44.243 Criminalistics I
44.244 Criminalistics II
44.261 Juvenile Delinquency
44.341 International Perspectives on Crime and Crime Control
44.370 Criminal Justice Management
44.371 Criminal Justice Planning
44.373 Issues in Police Administration
44.390 Introduction to Criminal Justice Research
44.490 Criminal Justice Honors Seminar

Law and the Courts
44.101 The Criminal Justice System
44.221 Criminology
44.233 Criminal Procedure
44.234 Criminal Law
44.261 Juvenile Delinquency
44.321 Advanced Criminology
44.331 Penal Law
44.335 Juvenile Justice
44.351 Community Based Corrections
44.360 Gender, Race, and Crime
44.370 Criminal Justice Management
44.371 Criminal Justice Planning
44.380 Selected Issues in Criminal Justice
44.390 Introduction to Criminal Justice Research
44.490 Criminal Justice Honors Seminar
46.230 Law and the Legal System

Corrections
44.101 The Criminal Justice System
44.151 Introduction to Corrections
44.221 Criminology
44.233 Criminal Procedure
44.234 Criminal Law
44.261 Juvenile Delinquency
44.331 Penal Law
44.351 Community Based Corrections
44.370 Criminal Justice Management
44.371 Criminal Justice Planning
44.372 Issues in Correctional Administration
44.390 Introduction to Criminal Justice Research
44.490 Criminal Justice Honors Seminar
46.230 Law and the Legal System

FREE ELECTIVES: REMAINING CREDITS

Please note that from among all electives, either collateral or free electives, that the student presents for graduation, at least two must be at the 300 or 400 course level.

BACHELOR OF SCIENCE IN CRIMINAL JUSTICE: PARALEGAL OPTION

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 120

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the students' own personal time constraints. A 2.2 cumulative average overall and a 2.5 average in the major are necessary for graduation.

FIRST YEAR

FIRST SEMESTER

41.103	Introduction to Paralegal Studies	3
42.101	College Writing I	3
44.101	The Criminal Justice System	3
		9

SECOND SEMESTER

44.301	Computer Applications for the Legal Profession	3
42.102	College Writing II	3
- -.- - -	General Education - Science*	3
		9

SECOND YEAR

FIRST SEMESTER

- -.- - -	General Education - Mathematics	3
- -.- - -	General Education - Social Sciences (SS)	3
46.230	Law and the Legal System	3
		9

SECOND SEMESTER

- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	Skills Requirement	3
44.234	Criminal Law	3
		9

THIRD YEAR

FIRST SEMESTER

- -.- - -	Collateral Elective	3
- -.- - -	Skills Requirement	3
- -.- - -	General Education - Science*	3
		9

SECOND SEMESTER

- -.- - -	Skills Requirement	3
- -.- - -	General Education - Arts/Humanities (AH)	3
- -.- - -	Collateral Elective	3
		9

FOURTH YEAR

FIRST SEMESTER

41.390	Litigation	3
41.387	Legal Research Methods	3
- -.- - -	Collateral Elective	3
		9

SECOND SEMESTER

- -.- - -	Paralegal Elective	3
- -.- - -	Collateral Elective	3
- -.- - -	Collateral Elective	3
		9

FIFTH YEAR

FIRST SEMESTER

41.376	Family Law	3
- -.- - -	General Education - Arts/Humanities (AH)	3
41.370	Real Estate Law	3
		9

SECOND SEMESTER

- -.- - -	General Education - Science*	3
- -.- - -	General Education - Social Sciences (SS)	3
41.363	Corporate and Property Law	3
		9

SIXTH YEAR

FIRST SEMESTER

- -.- - -	Paralegal Elective	3
- -.- - -	Paralegal Elective	3
- -.- - -	General Education - Arts/Humanities (AH)	3
		9

SECOND SEMESTER

- -.- - -	Free Elective	3
- -.- - -	Paralegal Elective	3
- -.- - -	Collateral Elective	3
		9

SEVENTH YEAR

FIRST SEMESTER

44.497	Paralegal Practicum/ Internship	3
- -.- - -	Collateral Elective	3
		6

SECOND SEMESTER

41.379	Law, Logic, and Ethics	3
- -.- - -	Free Elective	3
		6

*Science: three courses, nine credits minimum, with at least two courses that include some form of experimental learning.

PROFESSIONAL SKILLS REQUIREMENT: 12 CREDITS

All students must meet proficiency standards in foreign language or professional skills:

a. Intermediate proficiency in a modern foreign language, preferably Spanish (12 credits)

OR

b. Professional skills option:

44.301	Computer Applications for the Legal Profession	3
41.387	Legal Research Methods	3
41.379	Law, Logic, and Ethics	3
92.283	Introduction to Statistics	3

PARALEGAL OPTION REQUIREMENTS:

a. Required Courses:

41.103	Introduction to Paralegal Studies
44.234	Criminal Law
41.261	Introduction to Legal Concepts
OR	
46.230	Law and the Legal System
41.370	Real Estate Law
41.379	Law, Logic, and Ethics
41.390	Litigation
44.101	The Criminal Justice System
44.301	Computer Applications for the Legal Profession
41.363	Corporate and Property Law
41.376	Family Law
41.387	Legal Research Methods
44.497	Paralegal Practicum/Internship

BACHELOR OF SCIENCE IN CRIMINAL JUSTICE: PARALEGAL OPTION

Continued

b. The student may select an additional 12 credits in the major field. These courses can be chosen from the Criminal Justice Curriculum (44.- - - prefix) and/or from the following approved Paralegal course List:

41.366 International Law
41.367 Environmental Law and Regulations
41.368 Employment and Labor Law
41.371 Legal Issues in Health Care
41.490 Legal Aspects of Cyberspace
46.345 Constitutional Law and Politics
46.347 Civil Liberties, Law, and Politics

COLLATERAL REQUIREMENTS: 18 CREDITS

In addition to the major courses, the student should select six collateral course electives from the following suggested list of courses. Six credits of collateral electives must be at the 300 level or above. Courses used to fulfill the professional skills requirement may be used toward fulfillment of this requirement.

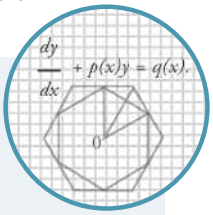
42.382 Crime in Literature
43.216 American Urban History I
43.217 American Urban History II
43.268 History of the Family and Childhood in the U.S.
43.308 History of Crime, Conflict, and Social Control in the U.S.
43.349 English Constitution and Legal History
45.203 Introduction to Ethics
46.105 Introduction to Public Policy
46.202 Practical Public Affairs
46.265 State and Local Politics
46.270 Legislative Politics
46.347 Civil Liberties, Law, and Politics
46.355 Government Fiscal Policy
46.356 Public Policy Analysis
46.360 Public Administration
46.410 Reading Seminar in Judicial Review
47.209 Social Psychology
47.232 Psychology of Personality
47.260 Child and Adolescent Development I
47.272 Abnormal Psychology
47.360 Human Development II
47.364 Psychology of Crime and Corrections
48.231 Sociology of the Family
48.234 Study of Minorities
48.235 Black Experience in American Life
48.255 Social Deviance
48.256 Political Sociology
48.341 Social Stratification
48.345 Urban Sociology
48.361 Sociology of Law and the Criminal Justice System
48.402 Social Research
92.283 Introduction to Statistics
92.363 Introduction to Data Analysis

Mathematics

Mathematics has always been essential to our intellectual and technological advancement, and in the coming decades, our reliance on the mathematical sciences will become increasingly universal. With the arrival of the twenty-first century, mastery of the tools and techniques that are covered by the mathematical sciences will define success. The major in Mathematics is designed to provide a sequence of courses that will acquaint the student with important concepts underlying the main branches of mathematics. The Mathematics and Information Technology majors are offered under the requirements of the College of Arts and Sciences.

Programs of study are available for the following specializations: Bioinformatics, Computational Mathematics, Information Technology, Statistics, Teacher Concentration and Theoretical Mathematics. For sample program outlines not included in this catalog, please contact the Coordinator of Mathematics Programs. The Bioinformatics and the Theoretical Mathematics options may require that several courses be taken from course offerings from the day school. Courses selected for concentration/option electives must have prior written approval of the coordinator or department chair.

Please Note: All mathematics courses (except 90.010 and 90.111) are transferable to the University of Massachusetts Lowell Day Division upon appropriate University approval. Courses with the prefix 92.- - - are equivalent to those in the day school with the same number. Day school students wishing to elect courses with the prefix 90.- - - must petition the chairperson and/or coordinator in order to determine course equivalence.



About Mathematical Sciences at UMass Lowell

The Mathematical Sciences Department of the University offers three bachelor's degree programs through Continuing Studies: Mathematics, Applied Mathematics and Information Technology. The Mathematics curriculum is intended for working professionals in a wide range of related disciplines: teaching, science, engineering, decision science, actuarial science, operations research, mathematical biology, bioinformatics, economics, computer science, etc. Students interested in the Mathematics major are encouraged to take advantage of its flexibility by taking a sequence of courses related to the mathematical application of their choice. Concentration electives and electives allow the student and advisor to tailor programs to individual objectives and talents. The flexibility of the program also allows students to take advantage of the many state-of-the-art Information Technology courses available through Continuing Studies.

BACHELOR OF SCIENCE IN MATHEMATICS

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 129

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the student's own personal time constraints.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

92.120	Precalculus Mathematics I	3
42.101	College Writing I	3
49.201	Economics I (Microeconomics) - General Education - Social Sciences (SS)	3
		9

SECOND SEMESTER

92.123	Precalculus Mathematics II	3
42.102	College Writing II	3
--.---	General Education - Social Sciences (SS)	3
		9

SECOND YEAR

FIRST SEMESTER

92.125	Calculus A	3
42.226	Technical and Scientific Communication	3
99.131	Technical Physics I	3
		9

SECOND SEMESTER

92.126	Calculus B	3
--.---	General Education - Arts & Humanities (AH)	3
99.132	Technical Physics II	3
		9

THIRD YEAR

FIRST SEMESTER

92.225	Calculus C	3
--.---	Elective**	3
--.---	General Education - Arts, Humanities & Diversity (AHD)	3
		9

SECOND SEMESTER

92.226	Calculus D	3
92.321	Discrete Structures I	3
92.385	Applied Statistics†† or	3
92.386	Probability and Statistics I††	9

FOURTH YEAR

FIRST SEMESTER

92.221	Linear Algebra I	3
--.---	Computing Requirement (see Program Coordinator)	3
--.---	GenEd - Science with Experimental Learning	3
--.---	GenEd - Science with Experimental Learning Lab	1
		10

SECOND SEMESTER

92.222	Linear Algebra II	3
--.---	General Education - Arts, Humanities & Ethics (AHE)	3
--.---	Gen. Ed.- Science with Experimental Learning	3
--.---	GenEd - Science with Experimental Learning Lab	1
		10

FIFTH YEAR

FIRST SEMESTER

92.234	Differential Equations	3
--.---	Elective**	3
--.---	Elective**	3
		9

SECOND SEMESTER

--.---	Mathematics Elective (300 level or above)*	3
--.---	General Education - Social Sciences (SS)	3
--.---	Concentration Elective*	3
		9

SIXTH YEAR

FIRST SEMESTER

92.---	_____ Analysis†	3
--.---	Elective**	3
--.---	Concentration Elective*	3
		9

SECOND SEMESTER

92.---	_____ Analysis†	3
--.---	Math Elective (300 level or above)*	3
--.---	Elective**	3
92.375	Senior Seminar I (see Program Coordinator)	1
		10

SEVENTH YEAR

FIRST SEMESTER

--.---	Mathematics Elective (300-level or above)*	3
--.---	Elective**	3
--.---	Elective**	3
		9

SECOND SEMESTER

92.475	Senior Seminar II (see Program Coordinator)	3
--.---	Concentration Elective*	3
--.---	Elective**	3
		9

*The purpose of concentration electives is to allow students, with the assistance of their advisor, to take advantage of the many state-of-the-art courses available at the University: science, information technology, engineering, decision science, actuarial science, operations research, mathematical biology, bioinformatics, economics, computer science, etc. A student may take a maximum of 15 credits of math courses (92 prefix) as concentration electives. 92.283 and 92.363 cannot be used as math electives.

**Electives may be chosen from any courses from the University. However, no more than 60 mathematics credits (beyond 92.120 and 92.123) can be counted toward graduation. All mathematics courses have prefix 92.

†Analysis requirements: One basic analysis course (92.305, 92.411, 92.501, 92.503) and one additional analysis course not used to fulfill another requirement (92.301, 92.305, 92.306, 92.322, 92.362, 92.411, 92.412, 92.413, 92.420, 92.421, 92.442, 92.450).

††Students may receive credit for both 92.385 and 92.386.

Many 500-level mathematics courses are within the grasp of upper level undergraduate students. Refer to the day school schedule of classes for graduate course listings. Many graduate courses are offered in the late afternoon/early evening time frame.

BACHELOR OF SCIENCE IN APPLIED MATHEMATICS

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 129

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the student's own personal time constraints.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

92.120	Precalculus Mathematics I	3
42.101	College Writing I	3
49.201	Economics I (Microeconomics)	3
	General Education - Social Sciences (SS)	9

SECOND SEMESTER

92.123	Precalculus Mathematics II	3
42.102	College Writing II	3
- -.- - -	General Education - Social Sciences (SS)	3
		9

SECOND YEAR

FIRST SEMESTER

92.125	Calculus A	3
42.226	Technical and Scientific Communication	3
99.131	Technical Physics I	3
		9

SECOND SEMESTER

92.126	Calculus B	3
- -.- - -	General Education - Arts & Humanities (AH)	3
99.132	Technical Physics II	3
		9

THIRD YEAR

FIRST SEMESTER

92.225	Calculus C	3
- -.- - -	Elective**	3
- -.- - -	General Education - Arts, Humanities & Diversity (AHD)	3
		9

SECOND SEMESTER

92.226	Calculus D	3
92.321	Discrete Structures I	3
92.385	Applied Statistics†† or	3
92.386	Probability and Statistics I††	9

FOURTH YEAR

FIRST SEMESTER

92.221	Linear Algebra I	3
- -.- - -	Computing Requirement (see Program Coordinator)	3
- -.- - -	GenEd - Science with Experimental Learning	3
- -.- - -	GenEd - Science with Experimental Learning Lab	1
		10

SECOND SEMESTER

92.222	Linear Algebra II	3
- -.- - -	General Education - Arts, Humanities & Ethics (AHE)	3
- -.- - -	GenEd - Science with Experimental Learning	3
- -.- - -	GenEd - Science with Experimental Learning Lab	1
		10

FIFTH YEAR

FIRST SEMESTER

92.234	Differential Equations	3
92.301	Intro. to Applied Mathematics I	3
- -.- - -	Elective**	3
		9

SECOND SEMESTER

- -.- - -	Mathematics Elective (300 level or above)	3
- -.- - -	General Education - Social Studies (SS)	3
- -.- - -	Elective**	3
		9

SIXTH YEAR

FIRST SEMESTER

92.- - -	_____ Analysis†	3
- -.- - -	Elective*	3
- -.- - -	Concentration Elective*	3
		9

SECOND SEMESTER

92.- - -	_____ Analysis†	3
- -.- - -	Math Elective (300 level or above)	3
- -.- - -	Elective**	3
92.375	Senior Seminar I (see Program Coordinator)	1
		10

SEVENTH YEAR

FIRST SEMESTER

92. 362	Numerical Analysis	3
- -.- - -	Math Elective (300 level or above)	3
- -.- - -	Elective**	3
		9

SECOND SEMESTER

92.475	Senior Seminar II (see Program Coordinator)	3
92.450	Mathematical Modeling	3
- -.- - -	Elective**	3
		9

*The purpose of concentration electives is to allow students, with the assistance of their advisor, to take advantage of the many state-of-the-art courses available at the University: science, information technology, engineering, decision science, actuarial science, operations research, mathematical biology, bioinformatics, economics, computer science, etc. A student may take a maximum of 15 credits of math courses (92 prefix) as concentration electives. 92.283 and 92.363 cannot be used as math electives.

**Electives may be chosen from any courses from the University. However, no more than 60 mathematics credits (beyond 92.120 and 92.123) can be counted toward graduation. All mathematics courses have prefix 92.

†Analysis requirements: One basic analysis course (92.305, 92.411, 92.501, 92.503) and one additional analysis course not used to fulfill another requirement (92.301, 92.305, 92.306, 92.322, 92.362, 92.411, 92.412, 92.413, 92.420, 92.421, 92.442, 92.450).

††Students may receive credit for both 92.385 and 92.386.

Many 500-level mathematics courses are within the grasp of upper level undergraduate students. Refer to the day school schedule of classes for graduate course listings. Many graduate courses are offered in the late afternoon/early evening time frame.

BACHELOR OF SCIENCE IN MATHEMATICS: STATISTICS CONCENTRATION

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 129

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the student's own personal time constraints.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

92.120	Precalculus Mathematics I	3
42.101	College Writing I	3
49.201	Economics I (Microeconomics)	3
	General Education - Social Sciences (SS)	9

SECOND SEMESTER

92.123	Precalculus Mathematics II	3
42.102	College Writing II	3
- -.- - -	General Education - Social Sciences (SS)	3
		9

SECOND YEAR

FIRST SEMESTER

92.125	Calculus A	3
42.226	Technical and Scientific Communication	3
99.131	Technical Physics I	3
		9

SECOND SEMESTER

92.126	Calculus B	3
- -.- - -	General Education - Arts & Humanities (AH)	3
99.132	Technical Physics II	3
		9

THIRD YEAR

FIRST SEMESTER

92.225	Calculus C	3
- -.- - -	Elective**	3
- -.- - -	General Education - Arts, Humanities & Diversity (AHD)	3
		9

SECOND SEMESTER

92.226	Calculus D	3
92.321	Discrete Structures I	3
92.385	Applied Statistics	3
		9

FOURTH YEAR

FIRST SEMESTER

92.221	Linear Algebra I	3
- -.- - -	Computing Requirement (see Program Coordinator)	3
- -.- - -	GenEd - Science with Experimental Learning	3
- -.- - -	GenEd - Science with Experimental Learning Lab	1
		10

SECOND SEMESTER

92.222	Linear Algebra II	3
- -.- - -	General Education - Arts, Humanities & Ethics (AHE)	3
- -.- - -	GenEd - Science with Experimental Learning	3
- -.- - -	GenEd - Science with Experimental Learning Lab	1
		10

FIFTH YEAR

FIRST SEMESTER

92.234	Differential Equations	3
- -.- - -	Elective**	3
- -.- - -	Elective**	3
		9

SECOND SEMESTER

92.386	Probability and Statistics I	3
- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	Concentration Elective*	3
		9

SIXTH YEAR

FIRST SEMESTER

92.- - -	_____ Analysis†	3
- -.- - -	Elective**	3
92.593	Experimental Design	3
		9

SECOND SEMESTER

92.- - -	_____ Analysis†	3
92.591	Linear Models/Regression	3
- -.- - -	Elective**	3
92.375	Senior Seminar I (see Program Coordinator)	1
		10

SEVENTH YEAR

FIRST SEMESTER

- -.- - -	Concentration Elective*	3
- -.- - -	Concentration Elective*	3
- -.- - -	Elective**	3
		9

SECOND SEMESTER

92.475	Senior Seminar II (see Program Coordinator)	3
- -.- - -	Concentration Elective*	3
- -.- - -	Elective**	3
		9

*The purpose of concentration electives is to allow students, with the assistance of their advisor, to take advantage of the many state-of-the-art courses available at the University: science, information technology engineering, decision science, actuarial science, operations research, mathematical biology, bioinformatics, economics, computer science, etc. A student may take a maximum of 15 credits of math courses (92 prefix) as concentration electives. 92.283 and 92.363 cannot be used as math electives.

**Electives may be chosen from any courses from the University. However, no more than 60 mathematics credits (beyond 92.120 and 92.123) can be counted toward graduation. All mathematics courses have prefix 92.- - -

†Analysis requirements: One basic analysis course (92.305, 92.411, 92.501, 92.503) and one additional analysis course not used to fulfill another requirement (92.301, 92.305, 92.306, 92.322, 92.362, 92.411, 92.412, 92.413, 92.420, 92.421, 92.442, 92.450).

Many 500-level mathematics courses are within the grasp of upper level undergraduate students. Refer to the day school schedule of classes for graduate course listings. Many graduate courses are offered in the late afternoon/early evening time frame.

BACHELOR OF SCIENCE IN MATHEMATICS: TEACHER CONCENTRATION

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 129

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the student's own personal time constraints.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

92.120	Precalculus Mathematics I	3
42.101	College Writing I	3
49.201	Economics I (Microeconomics)	3
	General Education - Social Sciences (SS)	9

SECOND SEMESTER

92.123	Precalculus Mathematics II	3
42.102	College Writing II	3
- -.- - -	General Education - Social Sciences (SS)	3
		9

SECOND YEAR

FIRST SEMESTER

92.125	Calculus A	3
42.226	Technical and Scientific Communication	3
99.131	Technical Physics I	3
		9

SECOND SEMESTER

92.126	Calculus B	3
- -.- - -	General Education - Arts & Humanities (AH)	3
99.132	Technical Physics II	3
		9

THIRD YEAR

FIRST SEMESTER

92.225	Calculus C	3
- -.- - -	Elective**	3
- -.- - -	General Education - Arts, Humanities & Diversity (AHD)	3
		9

SECOND SEMESTER

92.226	Calculus D	3
92.321	Discrete Structures I	3
92.385	Applied Statistics† or	3
92.386	Probability and Statistics I†	9

FOURTH YEAR

FIRST SEMESTER

92.221	Linear Algebra I	3
- -.- - -	Computing Requirement (see Program Coordinator)	3
- -.- - -	GenEd - Science with Experimental Learning	3
- -.- - -	GenEd - Science with Experimental Learning Lab	1
		10

SECOND SEMESTER

92.222	Linear Algebra II	3
- -.- - -	General Education - Arts, Humanities & Ethics (AHE)	3
- -.- - -	GenEd - Science with Experimental Learning	3
- -.- - -	GenEd - Science with Experimental Learning Lab	1
		10

FIFTH YEAR

FIRST SEMESTER

92.234	Differential Equations	3
- -.- - -	Concentration Elective*	3
- -.- - -	Elective**	3
		9

SECOND SEMESTER

- -.- - -	Mathematics Elective (300 level or above)*	3
- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	Concentration Elective*	3
		9

SIXTH YEAR

FIRST SEMESTER

92.420/520	Mathematical Problem Solving	3
- -.- - -	Elective**	3
- -.- - -	Concentration Elective*	3
		9

SECOND SEMESTER

92.503	Mathematical Analysis	3
- -.- - -	Math Elective (300 level or above)*	3
- -.- - -	Elective**	3
92.375	Senior Seminar I (see Program Coordinator)	1
		10

SEVENTH YEAR

FIRST SEMESTER

- -.- - -	Mathematics Elective	3
- -.- - -	Elective**	3
- -.- - -	Elective**	3
		9

SECOND SEMESTER

92.475	Senior Seminar II (see Program Coordinator)	3
- -.- - -	Concentration Elective*	3
- -.- - -	Elective**	3
		9

*Concentration Electives can be in Mathematics or another approved department. 92.283 and 92.363 cannot be used as math electives. See an advisor from the Graduate School of Education for approval of education courses. Select at least two courses from the following for Math/Concentration Electives: 92.410/510 Computers and Calculators in the Classroom, 92.413/513 Number Theory, 92.421/521 Abstract Algebra, 92.427/527 Geometry, or 92.435/535 History of Mathematical Sciences. No more than 60 math credits can be counted towards the degree.

Note: This concentration does not give students certification to teach mathematics. The requirements for certification to teach vary from state to state. The licensure to teach mathematics usually involves three parts: a Bachelor's Degree in Mathematics or the equivalent, courses in education and state exams. Therefore, students considering a teaching career are strongly advised to see their departmental advisor and to contact the UML Graduate School of Education. They have information on the credentialing requirements for many states, and they also have information on the Massachusetts Tests for Educator Licensure (MTEL). The courses required in the Teacher Option prepare students to take and pass these exams.

**Electives may be chosen from any courses from the University. However, no more than 60 mathematics credits (beyond 92.120 and 92.123) can be counted toward graduation. All mathematics courses have prefix 92.- - -

†Students may receive credit for both 92.385 and 92.386.

Many 500-level mathematics courses are within the grasp of upper level undergraduate students. Refer to the day school schedule of classes for graduate course listings. Many graduate courses are offered in the late afternoon/early evening time frame.

degree programs

Information Technology

Students who graduate with a degree in Information Technology are able to manage networks, write software, build web pages and multimedia presentations, or create and manage databases, depending on the areas they choose to study. The curriculum strikes a balance between theoretical and applied uses of Information Technology and is taught by faculty who are cutting-edge practitioners as well as educators. This degree provides students with the flexibility to integrate previous college and work experience with a program tailored to the student's particular areas of interest. Concentrations are formulated around areas such as programming, networking, database design and management, graphic design, or multimedia, and combined with general education to enable students to complete their degree as quickly as possible with the knowledge they need for their careers.

The major in Information Technology gives students the opportunity to learn the skills necessary to manage the stream of information particular to their area of interest using the ever-changing computer technology essential for success in the 21st Century. Many students come to the University to pursue certificates in UNIX, Information Technology, Multimedia Applications, Website Design and Development or Data/Telecommunications. They can then apply the courses taken to fulfill the certificate program towards a degree in Information Technology.

ASSOCIATE OF SCIENCE IN INFORMATION TECHNOLOGY - Available on campus or online

YEARS 1-4: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 60

The following course outline is only a suggested course load. Please note that UMass Lowell's online courses are offered during three semesters per year: Fall, Spring and Summer. Based on student experiences, we do not recommend registering for more than 3 online courses per semester.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

90.160	Introduction to Information Systems	3
42.101	College Writing I	3
90.112	Concepts in Algebra I*	3
		9

SECOND SEMESTER

90.202	Microsoft Office	3
42.102	College Writing II	3
90.119	Concepts in Algebra II or	3
92.120	Precalculus Mathematics I*	9

SECOND YEAR

FIRST SEMESTER

- -.- - -	Concentration Elective	3
42.224	Business Writing or	3
42.226	Technical and Scientific Communication	
90.267	C Programming OR	3
90.211	Intro to Programming w/C I (followed by 90.212 Intro to Programming w/C II)**	9

SECOND SEMESTER

- -.- - -	Concentration Elective	3
- -.- - -	Information Technology Elective	3
- -.- - -	Information Technology Elective	3
		9

THIRD YEAR

FIRST SEMESTER

- -.- - -	Information Technology Elective	3
49.201	Economics I (Microeconomics)	3
- -.- - -	Concentration Elective	3
		9

SECOND SEMESTER

- -.- - -	Information Technology Elective	3
49.202	Economics II (Macroeconomics)	3
- -.- - -	General Education - Arts, Humanities & Diversity AHD	3
		9

FOURTH YEAR

FIRST SEMESTER

92.283	Introduction to Statistics	3
- -.- - -	General Education Arts & Humanities (AH)	3
- -.- - -	Information Technology Elective	3
		9

*Cannot get credit for both 90.120 and 90.112/90.119 sequence. Note: 90.112/119 available only on campus.

**Cannot get credit for both 90.267 and 90.211/90.212 sequence.

Concentration Electives

The student must choose a sequence of three related (non-computer) courses to fulfill the concentration electives. Students should consult with their academic advisor regarding possible concentrations to fulfill this requirement.

The following courses are examples of courses that may be used towards the concentration elective and are available on campus or online. Student should select three courses in the same subject area (see first two digits of course number) or consult with an advisor for guidance in course selections.

43.108	World History II
43.206	American Economic History
43.274	Native American History
43.308	Crime and Social Control
47.101	General Psychology
47.260	Child and Adolescent Development I
47.272	Abnormal Psychology
47.312	Learning and Behavior
47.335	Psychology and Women
47.351	Human Sexuality
47.360	Adult Development and Aging
47.363	Introduction to Disabilities Studies
48.351	Sociology of Health and Health Care
60.201	Accounting/Financial
62.201	Marketing Principles
63.301	Management Information Systems

Information Technology Electives

Information Technology electives may be chosen from any computer courses with a prefix of 90.- - - or 91.- - -
The following courses are examples of courses available on campus and online. A more comprehensive list is available in each semester's course bulletin or on our website:

90.220	Visual Basic
90.224	Advanced Visual Basic
90.230	Introduction to Multimedia
90.231	Graphics for Multimedia and the WWW
90.232	Desktop Video Production
90.236	Instructional Design for Interactive Media
90.238	Website Development: Microsoft® Expression® Web
90.247	Advanced Web Authoring: Adobe® Flash®
90.250	E-Commerce on the Web
90.268	C++ Programming
90.269	Advanced C++ Programming
90.270	Visual C++
90.291	Introduction to HTML
90.297	Introduction to Java Programming
90.301	Java Programming
90.302	JavaScript
90.303	Advanced Java Programming
90.305	Introduction to Perl
90.311	Introduction to UNIX
90.312	UNIX Shell Programming
90.340	Introduction to the Application & Development of Intranets
90.341	Intranet Applications for the Organization
90.342	Web-Enabled Database Development
90.360	Introduction to Data Structures
90.364	Problem Solving with C
90.461	LAN/WAN Technologies
90.462	TCP/IP & Network Architecture
90.464	Network Management
90.474	Relational Database Concepts
90.480	Project-Based Information Systems (6 credits)
91.113	Exploring the Internet

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY - Available on campus or online

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 120

The following course outline is only a suggested course load. Please note that UMass Lowell's online courses are offered during three semesters per year: Fall, Spring and Summer. Based on student experiences, we do not recommend registering for more than 3 online courses per semester.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

90.160	Introduction to Information Systems	3
42.101	College Writing I	3
90.112	Concepts in Algebra I*	3
		9

SECOND SEMESTER

90.202	Microsoft Office	3
42.102	College Writing II	3
90.119	Concepts in Algebra II or	3
92.120	Precalculus Mathematics*	9

SECOND YEAR

FIRST SEMESTER

- -.- - -	Concentration Elective	3
42.224	Business Writing OR	3
42.226	Technical and Scientific Communication	
90.267	C Programming OR	3
90.211	Intro to Programming w/C I (followed by 90.212 Intro to Programming w/ C II)**	9

SECOND SEMESTER

- -.- - -	Concentration Elective	3
- -.- - -	Information Technology Elective	3
- -.- - -	Information Technology Elective	3
		9

THIRD YEAR

FIRST SEMESTER

- -.- - -	Information Technology Elective	3
49.201	Economics I (Microeconomics) (SS)	3
- -.- - -	Concentration Elective	3
		9

SECOND SEMESTER

- -.- - -	Information Technology Elective	3
49.202	Economics II (Macroeconomics) (SS)	3
- -.- - -	General Education - Arts, Humanities & Diversity AHD	3
		9

FOURTH YEAR

FIRST SEMESTER

92.283	Introduction to Statistics	3
- -.- - -	General Education - Arts & Humanities (AH)	3
- -.- - -	Information Technology Elective	3
		9

ADDITIONAL SEMESTERS

In order to receive a Bachelor of Science Degree, the student must complete the preceding Associate's Degree requirements, plus the following:

- -.- - -	General Education - Arts & Humanities (AH)	3
- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	General Education - Ethics	3
- -.- - -	General Education - Science with Experimental Learning	3
- -.- - -	General Education - Science with Experimental Learning	3
- -.- - -	General Education - Science with Technology	3
- -.- - -	Elective	3
- -.- - -	Elective	3
- -.- - -	Elective	3
92.321	Discrete Structures I	3
90.477	Information Systems I	3
90.478	Information Systems II or	3
90.480	Project-Based Information Systems (Note: 90.477/478 are not available online)	6
- -.- - -	Information Technology Elective	3
- -.- - -	Information Technology Elective	3
- -.- - -	Information Technology Elective	3
- -.- - -	Information Technology Elective	3
- -.- - -	Concentration Elective	3
- -.- - -	Concentration Elective	3
- -.- - -	Concentration Elective	3

*Cannot get credit for both 92.120 and 90.112/90.119 sequence. Note: 90.112/119 are not available online.

**Cannot get credit for both 90.267 and 90.211/90.212 sequence.

Concentration Electives

The student must choose a sequence of six related (non-computer) courses to fulfill the concentration electives. Students should consult with their academic advisor regarding possible concentrations to fulfill this requirement. The following courses are examples of courses that may be used towards this requirement and are available on campus or online. A more comprehensive list is available in each semester's course bulletin or on our website. Student should select six courses in the same subject area (see first two digits of course number) or consult with an advisor for guidance in course selections.

43.108	World History II
43.206	American Economic History
43.274	Native American History
43.308	Crime and Social Control
47.101	General Psychology
47.260	Child and Adolescent Development I
47.272	Abnormal Psychology
47.312	Learning and Behavior
47.335	Psychology and Women
47.351	Human Sexuality
47.360	Adult Development and Aging
47.363	Introduction to Disabilities Studies
60.201	Accounting/Financial
62.201	Marketing Principles
63.301	Management Information Systems

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

Continued

Information Technology Electives

Information Technology electives may be chosen from any computer courses with a prefix of 90.- - - or 91.- - -. The following courses are examples of courses available on campus and online. A more comprehensive list of Information Technology electives is available in each semester's course bulletin or on our website.

90.220 Visual Basic
90.224 Advanced Visual Basic
90.230 Introduction to Multimedia
90.231 Graphics for Multimedia and the WWW
90.232 Desktop Video Production
90.236 Instructional Design for Interactive Media
90.238 Website Development: Microsoft® Expression® Web
90.247 Advanced Web Authoring: Adobe® Flash®
90.250 E-Commerce on the Web
90.268 C++ Programming
90.269 Advanced C++ Programming
90.270 Visual C++
90.291 Introduction to HTML
90.297 Introduction to Java Programming
90.301 Java Programming
90.302 JavaScript
90.303 Advanced Java Programming
90.305 Introduction to Perl
90.311 Introduction to UNIX
90.312 UNIX Shell Programming
90.342 Web-Enabled Database Development
90.360 Introduction to Data Structures
90.364 Problem Solving with C
90.461 LAN/WAN Technologies
90.462 TCP/IP & Network Architecture
90.464 Network Management
90.474 Relational Database Concepts
90.480 Project-Based Information Systems (6 credits)
91.113 Exploring the Internet

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY: BUSINESS MINOR - Available on campus or online

YEARS 1-7: SUGGESTED PROGRAM OF STUDY

TOTAL CREDITS: 120

The following course outline is only a suggested course load. Please note that UMass Lowell's online courses are offered during three semesters per year: Fall, Spring and Summer. Based on student experiences, we do not recommend registering for more than 3 online courses per semester.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

90.160	Introduction to Information Systems	3
42.101	College Writing I	3
		6

SECOND SEMESTER

90.202	Microsoft Office (Students who can document proficiency in Microsoft Office may substitute an Information Technology elective)	3
42.102	College Writing II	3
92.120	Precalculus Mathematics I	3
		9

THIRD SEMESTER

42.224	Business Writing OR	3
42.226	Technical and Scientific Communication	
90.267	C Programming OR	3
90.211	Intro to Programming w/ C I (followed by 90.212 Intro to Programming w/ C II)*	
- -.- - -	Information Technology Elective**	3
		9

SECOND YEAR

FIRST SEMESTER

- -.- - -	Information Technology Elective**	3
- -.- - -	General Education - Arts, Humanities & Diversity (AHD)	3
- -.- - -	Information Technology Elective**	3
		9

SECOND SEMESTER

49.201	Economics I* (Microeconomics)	3
- -.- - -	Information Technology Elective**	3
60.201	Accounting/Financial†	3
		9

THIRD SEMESTER

49.202	Economics II (Macroeconomics)	3
62.201	Marketing Principles†	3
- -.- - -	Information Technology Elective**	3
		9

THIRD YEAR

FIRST SEMESTER

92.283	Introduction to Statistics	3
61.301	Business Finance†	3
- -.- - -	General Education - Arts & Humanities (AH)	3
		9

ADDITIONAL SEMESTERS

In order to receive a Bachelor of Science Degree, the student must complete the preceding Associate's Degree requirements, plus the following:

- -.- - -	General Education - Social Sciences (SS)	3
- -.- - -	General Education - Social Sciences (SS)	3
92.321	Discrete Structures I	3
90.480	Project-Based Information Systems	6
- -.- - -	General Education - Social Sciences & Ethics	3
- -.- - -	General Education - Arts & Humanities (AH)	3
- -.- - -	General Education - Science with Experimental Learning	3
- -.- - -	General Education - Science with Experimental Learning	3
- -.- - -	Information Technology Elective**	3
- -.- - -	Information Technology Elective**	3
- -.- - -	Information Technology Elective**	3
- -.- - -	Information Technology Elective**	3
63.301	Management Information Systems†	3
66.301	Organizational Behavior†	3
6-.3/4- -	College of Management 300/400 Elective†	3
- -.- - -	General Elective	3
- -.- - -	General Elective	3
- -.- - -	General Elective	3
- -.- - -	General Elective	3

BUSINESS MINOR

49.201	Economics I	3
60.201	Accounting/Financial	3
62.201	Marketing Principles	3
61.301	Business Finance	3
63.301	Management Information Systems	3
66.301	Organizational Behavior	3
6-.- - -	College of Management 300/400 Elective†	3

Requires junior standing and any pre-requisites particular to the course.

*Cannot receive credit for both 90.267 and 90.211/90.212 sequence.

**Information Technology Electives may be chosen from any computer courses with a prefix of 90.- - - or 91.- - -

†Students need permission of College of Management Coordinator for these Business Minor Concentration elective courses.

SECOND DEGREE OPTION: THE BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY - Available on campus or online

SUGGESTED PROGRAM OF STUDY - TOTAL CREDITS: 30

Interested in changing careers? If you already have a Bachelor's Degree and would like to pursue a second degree in Information Technology, UMass Lowell has a special program for you. Students can pursue a Second Bachelor's Degree in Information Technology by taking 10 additional IT courses in designated areas. These courses must all be taken at UMass Lowell. Please note the second degree must have a different nomenclature from the previous degree. A comprehensive list of courses available to fulfill the requirements of this program can be found in each semester's course bulletin or on our website.

REQUIRED COURSES

90.477	Information Systems I	3
	AND	
90.478	Information Systems II	3
	OR	
90.480	Project-Based Information Systems	6

ELECTIVES

The following courses must be at the 200 level or above:

90.- - -	Information Technology Elective	3
90.- - -	Information Technology Elective	3
90.- - -	Information Technology Elective	3
90.- - -	Information Technology Elective	3
90.- - -	Information Technology Elective	3

The following courses must be at the 300 level or above:

90.- - -	Information Technology Elective	3
90.- - -	Information Technology Elective	3
90.- - -	Information Technology Elective	3

Visit our website to download the course completion worksheet for this program.

degree programs

The Francis College of Engineering

THE FRANCIS COLLEGE OF ENGINEERING OFFERS THE FOLLOWING CONTINUING STUDIES UNDERGRADUATE PROGRAMS:

ASSOCIATE'S AND BACHELOR'S DEGREE PROGRAMS:

Civil Engineering Technology, A.S., B.S.

Civil Engineering Technology - Surveying Option, A.S.

Electronic Engineering Technology, A.S., B.S.

Mechanical Engineering Technology, A.S., B.S.

CERTIFICATE PROGRAMS:

Computer-Assisted Manufacturing

Computer Engineering Technology

Electronics Technology

Land Surveying

Manufacturing Technology

Plastics Engineering Technology

FOR MORE INFORMATION ON CERTIFICATE PROGRAM DESCRIPTIONS AND REQUIREMENTS, SEE THE CERTIFICATE PROGRAMS SECTION IN THIS CATALOG OR VISIT OUR WEBSITE AT HTTP://CONTINUINGED.UML.EDU

About Engineering Technology at UMass Lowell

The mission of the Engineering Technology Department is to focus on the applied aspects of science and engineering, which will prepare graduates for practice and implementation of new and existing technology in the complex industrial world. Engineering Technology is that part of the technology field that requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupation spectrum between the craftsman and the engineer, at the end of the spectrum closest to the engineer. Engineering Technology programs are primarily concerned with producing graduates to work with and manage machines, materials, processes, people and money for industrial firms.

The curriculum in Engineering Technology places less emphasis on abstract mathematics and general scientific principles and greater stress on the applications of these tools to the solution of practical problems. The technology disciplines emphasize specific technical areas leading to development of specific skills that can be applied immediately. The B.S. programs are designed as terminal degree programs for part-time Continuing Studies students. Advancement to a graduate program may require additional coursework.

Civil Engineering Technology

The Civil Engineering Technology curriculum is designed to provide students with a balanced foundation in physical and mathematical sciences, various fields in civil engineering technology, computer usage, social sciences and the humanities. The subject matter covered in this program is generally similar to that covered in the Civil Engineering curriculum but with less emphasis on theory and greater concentration on application.

The graduates from this program are generally employed as technologists and entry-level professionals in fields such as construction and design of buildings, industrial facilities, roadways, tunnels, bridges, environmental projects, land development, substructure investigations and material testing.

ASSOCIATE OF SCIENCE IN CIVIL ENGINEERING TECHNOLOGY

YEARS 1-4: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 68

Building and maintaining the critical infrastructure of today's society demands both technical insight and hands-on experience. Students pursing the Civil Engineering Technology program gain a solid background in structural engineering, material properties, soils, infrastructure and environmental factors.

For students entering the program in or after September 2009.

FIRST YEAR

FIRST SEMESTER

92.120 Precalculus Mathematics I
23.101 Engineering Graphics
42.101 College Writing I

SECOND SEMESTER

92.123 Precalculus Mathematics II
15.113 Computer-Aided Design and Drafting (CAD)
42.102 College Writing II

SECOND YEAR

FIRST SEMESTER

15.123 Surveying I
92.125 Calculus A
99.131 Technical Physics I

SECOND SEMESTER

15.124 Surveying II
92.126 Calculus B
99.132 Technical Physics II

THIRD YEAR

FIRST SEMESTER

15.237 Statics
15.246 Fluid Mechanics/Hydraulics
23.226 Technical Communication for Engineering Technology

SECOND SEMESTER

15.239 Strength of Materials
15.247 Hydraulics Laboratory
47.101 General Psychology (SS)

FOURTH YEAR

FIRST SEMESTER

43.- - - General Education - Arts & Humanities (AHD)
15.251 Structural Analysis I
15.253 Reinforced Concrete I

SECOND SEMESTER

15.257 Highway Elements
15.242 Steel Design I
15.224 Materials/Structural Lab

BACHELOR OF SCIENCE IN CIVIL ENGINEERING TECHNOLOGY

YEARS 1-8: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 124

Students in the Civil Engineering Technology Bachelor's Degree program gain a solid background in structural engineering, material properties, soils, infrastructure and environmental factors. Graduates of the program may be employed as technologists and entry-level professionals in fields such as construction and design of buildings, industrial facilities, roadways, tunnels, bridges, environmental projects, land development, substructure investigations and material testing.

For students entering the program in or after September 2009.

FIRST YEAR

FIRST SEMESTER

92.120 Precalculus Mathematics I
23.101 Engineering Graphics
42.101 College Writing I

SECOND SEMESTER

92.123 Precalculus Mathematics II
15.113 Computer-Aided Design and Drafting (CAD)
42.102 College Writing II

SECOND YEAR

FIRST SEMESTER

15.123 Surveying I
92.125 Calculus A
99.131 Technical Physics I

SECOND SEMESTER

15.124 Surveying II
92.126 Calculus B
99.132 Technical Physics II

THIRD YEAR

FIRST SEMESTER

15.237 Statics
15.246 Fluid Mechanics/Hydraulics
23.226 Technical Communication for Engineering Technology

SECOND SEMESTER

15.239 Strength of Materials
15.247 Hydraulics Laboratory
47.101 General Psychology

FOURTH YEAR

FIRST SEMESTER

43.- - - General Education - Arts & Humanities (AHD)
15.251 Structural Analysis I
15.253 Reinforced Concrete I

SECOND SEMESTER

15.257 Highway Elements
15.242 Steel Design I
15.224 Materials/Structural Lab

FIFTH YEAR

FIRST SEMESTER

15.131 Environmental Chemistry I
15.254 Soil Mechanics I

SECOND SEMESTER

15.- - - CET Elective
15.394 Soil Mechanics Laboratory

SIXTH YEAR

FIRST SEMESTER

15.355 Water Distribution Systems
15.315 Land Development Desktop
15.396 Groundwater Resources

SECOND SEMESTER

15.- - - CET Elective
15.238 Dynamics
15.263 Wastewater Operations Lab I

SEVENTH YEAR

FIRST SEMESTER

49.201 Economics I (Microeconomics) (SS)
15.261 Wastewater Treatment Plant Operations I
23.262 Engineering Data Analysis

SECOND SEMESTER

15.- - - CET Elective
48.- - - General Education - Social Sciences (SS) (D or E)
15.353 Forensic Engineering

EIGHTH YEAR

FIRST SEMESTER

23.414 Engineering Economics
45.- - - General Education - Arts & Humanities (AHE)

SECOND SEMESTER

15.470 Construction Project Management
42.- - - General Education - Arts & Humanities (AHD or E)

ELECTIVES

Students must choose three approved CET electives:

15.132 Environmental Chemistry II
15.262 Legal Aspects of Land Surveying
15.280 Industrial Waste Treatment
15.299 Surveying III
15.340 Hazardous Waste Management
15.352 Structural Analysis II
15.361 Wastewater Treatment Plant Operations II
15.383 Steel Design II
15.391 Reinforced Concrete Design II
15.392 Soil Mechanics II
15.420 Solid Waste Management
15.486 Transportation Elements

The Bachelor of Science Degree in Civil Engineering Technology is accredited by the Technology Accreditation Commission of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD, 410-347-7700.

degree programs

ASSOCIATE OF SCIENCE IN CIVIL ENGINEERING TECHNOLOGY: SURVEYING OPTION

YEARS 1-4: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 64

Students in the Civil Engineering Technology program gain a solid background in structural engineering, material properties, soils, infrastructure and environmental factors. The Associate's Degree in Civil Engineering Technology with the Surveying Option focuses on the application of surveying information to civil engineering projects such as water resources, sanitary sewers and property subdivision. Graduates are generally employed as entry-level professionals in fields such as construction and design of buildings, industrial facilities, roadways, tunnels, bridges, environmental projects and land development.

For students entering the program in or after September 2005.

FIRST YEAR

FIRST SEMESTER

92.120	Precalculus Mathematics I	3
23.101	Engineering Graphics	2
		5

SECOND SEMESTER

92.123	Precalculus Mathematics II	3
15.113	Computer-Aided Design and Drafting (CAD)	2
42.101	College Writing I	3
		8

SECOND YEAR

FIRST SEMESTER

15.123	Surveying I	4
92.125	Calculus A	3
99.131	Technical Physics I	3
		10

SECOND SEMESTER

15.124	Surveying II	4
92.126	Calculus B	3
15.237	Statics	3
		10

THIRD YEAR

FIRST SEMESTER

99.132	Technical Physics II	3
15.246	Hydraulics	3
42.102	College Writing II	3
		9

SECOND SEMESTER

15.239	Strength of Materials	3
43.- - -	General Education - Arts & Humanities (AH)	3
42.226	Technical and Scientific Communication	3
		9

FOURTH YEAR

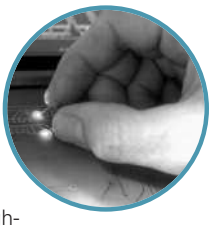
FIRST SEMESTER

15.254	Soil Mechanics I	3
15.299	Surveying III	3
15.262	Legal Aspects of Land Surveying	3
		9

SECOND SEMESTER

15.257	Highway Elements	3
15.224	Materials/Structural Lab	1
		4

Electronic Engineering Technology



The Electronic Engineering Technology program has, over the years, adjusted to area students and the high technology industry. It can accommodate virtually all types of students, from those who wish to minimize the calculus content and terminate with the Associate's Degree to those who wish to specialize by taking fairly high-level technical electives and eventually obtain the baccalaureate degree.

ASSOCIATE OF SCIENCE IN ELECTRONIC ENGINEERING TECHNOLOGY

YEARS 1-4: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 64

Students in the Electronic Engineering Technology Associate's Degree program learn about the fundamentals of circuit design, voltage, semiconductor devices, theory vs. simulation, transistors, microprocessors and more. The program helps prepare students for employment in a variety of fields including consumer electronics, telecommunications and semiconductors – wherever there is a need for the design, testing and manufacturing of hardware and software for all things electrical.

For students entering the program in or after September 2009.

FIRST YEAR

FIRST SEMESTER

42.101 College Writing I
92.120 Precalculus Mathematics I
43.- - - General Education - Arts & Humanities (AHD)

SECOND SEMESTER

42.102 College Writing II
92.123 Precalculus Mathematics II
90.267 C Programming

SECOND YEAR

FIRST SEMESTER

17.213 Circuits I
92.125 Calculus A
42.226 Technical Communication for Engineering Technology

SECOND SEMESTER

17.214 Circuits II and Laboratory
92.126 Calculus B
99.131 Technical Physics I

THIRD YEAR

FIRST SEMESTER

17.215 Circuits III and Laboratory
17.355 Electronics I and Laboratory
99.132 Technical Physics II

SECOND SEMESTER

17.216 Circuits IV
17.356 Electronics II and Laboratory
17.354 PSPICE Simulation

FOURTH YEAR

FIRST SEMESTER

47.101 General Psychology (SS)
17.357 Electronics III & Laboratory
17.383 Microprocessors A

SECOND SEMESTER

17.361 Project Laboratory A
17.358 Electronics IV and Laboratory
17.384 Microprocessors B

Students enrolling in this program should purchase an electronic calculator capable of handling logarithmic and trigonometric functions. The use of the calculator will be an integral part of courses 17.213 and 17.214, where proficiency will be developed.

Competency in the use of the calculator will be assumed in all subsequent E.E.T. courses.

Proper approval for a 17.3- -/4- - course is automatically assumed if all prerequisites are satisfied.

BACHELOR OF SCIENCE IN ELECTRONIC ENGINEERING TECHNOLOGY

YEARS 1-8: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 127

The Bachelor of Science Degree in Electronic Engineering Technology is designed to prepare graduates for employment in a variety of fields, including consumer electronics, telecommunications and semiconductors – wherever there is a need for the design, testing and manufacturing of hardware and software for all things electrical. The curriculum focuses on the application of electronics principles and critical thinking to the solution of practical problems. Students learn to use math and computers to solve circuit problems, they learn about equipment testing, and they learn how to apply the technologies they learn and the fundamentals of electronics to address real-world problems. The program also prepares highly motivated students who are interested in continuing their studies to pursue an advanced degree in Electrical Engineering at UMass Lowell (visit the University's Graduate Admissions website for details).

For students entering the program in or after September 2009.

FIRST YEAR

FIRST SEMESTER

42.101 College Writing I
92.120 Precalculus Mathematics I
43.- - - General Education - Arts & Humanities (AHD)

SECOND SEMESTER

42.102 College Writing II
92.123 Precalculus Mathematics II
90.267 C Programming

SECOND YEAR

FIRST SEMESTER

17.213 Circuits I
92.125 Calculus A
23.226 Technical Communication for Engineering Technology

SECOND SEMESTER

17.214 Circuits II and Laboratory
92.126 Calculus B
99.131 Technical Physics I

THIRD YEAR

FIRST SEMESTER

17.215 Circuits III and Laboratory
17.355 Electronics I and Laboratory
99.132 Technical Physics II

SECOND SEMESTER

17.216 Circuits IV
17.356 Electronics II and Laboratory
17.354 PSPICE Simulation

FOURTH YEAR

FIRST SEMESTER

47.101 General Psychology (SS)
17.357 Electronics III and Laboratory
17.383 Microprocessors A

Proper approval for a 17.3- -/4- - course is automatically assumed if all prerequisites are satisfied.

SECOND SEMESTER

17.361 Project Laboratory A
17.358 Electronics IV and Laboratory
17.384 Microprocessors B

FIFTH YEAR

FIRST SEMESTER

17.341 Logic Design I and Lab
17.353 Digital Electronics
92.225 Calculus C

SECOND SEMESTER

17.365 Applied Linear Devices
90.268 C++ Programming
92.226 Calculus D

SIXTH YEAR

FIRST SEMESTER

17.342 Logic Design II and Lab
92.234 Differential Equations
99.133 Technical Physics III

SECOND SEMESTER

17.360 Mathematics and Statistics/E.E.T.
17.368 Data Conversion and Lab
17.376 Electromagnetic Theory I

SEVENTH YEAR

FIRST SEMESTER

17.350 Control Systems
17.3/4– E.E.T. Elective
42.- - - General Education - Arts & Humanities (AH)

SECOND SEMESTER

17.3/4– E.E.T. Elective
45.- - - General Education - Arts & Humanities (AHE)
48.- - - General Education - Social Sciences (SS) (D or E)

EIGHTH YEAR

FIRST SEMESTER

49.201 Economics I (SS) (Microeconomics)
17.391 Project Laboratory B

SECOND SEMESTER

17.3/4– E.E.T. Elective
17.392 Project Laboratory C

ELECTIVES

Students must choose three approved EET electives:

17.403 Foundations of Microwave Design
17.427 Digital Signal Processing
17.459 Power Conversion I
17.469 Control Systems II
17.477 Electromagnetic Theory II

Students who want to take more computer courses may complete the EET degree by filling the EET technical electives with computer courses. See the EET advisor for details.

INDUSTRIAL EXPERIENCE AND PROJECT LABORATORY

Appropriate industrial experience is very important for students in the Electronic Engineering Technology program. Students who have a few years industrial experience and have worked on a specific project in a high-technology company can use this experience as part of the Project Laboratory courses. To obtain credit for a Project Laboratory, the students must do the following:

a. Register for Project Laboratory;
b. Write an outline for the project intended to be used for credit;
c. Write a report on the project;
d. Give a presentation; AND
e. Obtain a letter from their supervisor at work that they have contributed to the project.

Up to 4 credits can be received for industrial projects in two Project Laboratories.

GRADUATE STUDY

Students who want to earn a graduate degree at UMass Lowell can take three EET technical electives from among courses that are more mathematically intense and required to enter the graduate program. See the Electrical and Computer Engineering Graduate Advisor for details.

The Bachelor of Science Degree in Electronic Engineering Technology is accredited by the Technology Accreditation Commission of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD, 410-347-7700.

Mechanical Engineering Technology

The Mechanical Engineering Technology program at the University of Massachusetts Lowell has been developed to provide the student with a broad background in scientific and engineering technology and the technical skills needed to support engineering activities. The core of the MET curriculum provides a sound foundation in communications, mathematics, basic sciences, basic engineering technology skills and in the humanities. The program emphasis is on application of engineering technology skills rather than on rigorous theory. Technical courses typically concentrate in design, solid mechanics, thermo/fluids and manufacturing. Problem solving and teamwork procedures are stressed in the technical courses and in supplementary courses devoted to those skills.

The Mechanical Engineering Technology program offers students a spectrum of career opportunities in manufacturing, plant management, product testing and evaluation, quality assurance, and engineering-support operations. Currently employed individuals are provided opportunities to augment knowledge in areas that suit the requirements of their current industry or provide opportunity for advancement into another industry or occupational role.

ASSOCIATE OF SCIENCE IN MECHANICAL ENGINEERING TECHNOLOGY

YEARS 1-4: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 67

The Associate's Degree in Mechanical Engineering Technology offers students a broad foundation in engineering technology and the technical skills needed to support engineering activities, particularly in the design, testing and manufacture of products, systems and devices. Graduates of this program possess the skills necessary to specify, install, test, operate, maintain and document basic mechanical systems. Career opportunities include support operations in manufacturing, plant management, product testing, quality assurance and engineering.

For students entering the program in or after September 2009.

FIRST YEAR

FIRST SEMESTER

92.120 Precalculus Mathematics I
23.101 Engineering Graphics
42.101 College Writing I

SECOND SEMESTER

92.123 Precalculus Mathematics II
23.102 Engineering Design & Graphics
42.102 College Writing II

SECOND YEAR

FIRST SEMESTER

92.125 Calculus A
99.131 Technical Physics I
23.226 Technical Communication for Engineering Technology

SECOND SEMESTER

92.126 Calculus B
99.132 Technical Physics II
23.295 Materials Science

THIRD YEAR

FIRST SEMESTER

23.200 Computer Aided Drafting
23.221 Statics
23.241 Elements of Thermodynamics I

SECOND SEMESTER

17.130 Electrical Basics and Lab
23.222 Dynamics
23.223 Mechanics of Materials

FOURTH YEAR

FIRST SEMESTER

23.242 Applied Fluid Mechanics
23.202 Thermo/Fluids Laboratory
47.101 General Psychology (SS)

SECOND SEMESTER

17.131 Electronic Basics and Lab
43.- - - General Education - Arts & Humanities (AHD)
23.302 Mechanics/Materials Lab

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING TECHNOLOGY

YEARS 1-8: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 126

The Bachelor's Degree in Mechanical Engineering Technology offers students a broad background in engineering technology and the technical skills needed to support the design, testing and manufacture of products, systems and devices. Students in the Bachelor's Degree program are prepared to apply in-depth concepts to the analysis, development, implementation and oversight of mechanical systems and processes. Career opportunities for graduates of this program include support operations in manufacturing, plant management, product testing, quality assurance and engineering.

For students entering the program in or after September 2009.

FIRST YEAR

FIRST SEMESTER

92.120 Precalculus Mathematics I
23.101 Engineering Graphics
42.101 College Writing I

SECOND SEMESTER

92.123 Precalculus Mathematics II
23.102 Engineering Design & Graphics
42.102 College Writing II

SECOND YEAR

FIRST SEMESTER

92.125 Calculus A
99.131 Technical Physics I
23.226 Technical Communication for Engineering Technology

SECOND SEMESTER

92.126 Calculus B
99.132 Technical Physics II
23.295 Materials Science

THIRD YEAR

FIRST SEMESTER

23.200 Computer Aided Drafting
23.221 Statics
23.241 Elements of Thermodynamics I

SECOND SEMESTER

17.130 Electrical Basics and Laboratory
23.222 Dynamics
23.223 Mechanics of Materials

FOURTH YEAR

FIRST SEMESTER

23.242 Applied Fluid Mechanics
23.202 Thermo/Fluids Laboratory
47.101 General Psychology (SS)

SECOND SEMESTER

17.131 Electronic Basics and Lab.
43.- - - General Education - Arts & Humanities (AHD)
23.302 Mechanics/Materials Lab.

FIFTH YEAR

FIRST SEMESTER

23.305 Manufacturing Processes
92.225 Calculus C
84.111 General Chemistry I

SECOND SEMESTER

23.314 Manufacturing Productivity
- -.- - - Technical Elective
23.354 Problems in Mechanical Engineering Technology

SIXTH YEAR

FIRST SEMESTER

23.320 Machine Design
84.113 General Chemistry Lab I
23.262 Engineering Data Analysis

SECOND SEMESTER

48.- - - General Education - Social Sciences (SS) (D or E)
23.243 Elements of Thermodynamics II
45.- - - General Education - Arts & Humanities (AHE)

SEVENTH YEAR

FIRST SEMESTER

49.201 Economics I (Microeconomics) (SS)
23.475 Heat Transfer
42.- - - General Education - Arts & Humanities (AH)

SECOND SEMESTER

23.480 Computer Aided Design
23.301 Manufacturing Technology Laboratory

EIGHTH YEAR

FIRST SEMESTER

23.414 Engineering Economics
23.402 Engineering Measurement Laboratory

SECOND SEMESTER

23.484 Intro Pro-E
- -.- - - Technical Elective

ELECTIVES

Students must choose two approved technical electives:

23.419 Applied Computer Aided Manufacturing
90.211 Introduction to Programming with C-1
23.416 Statistical Quality Control
23.353 Forensic Engineering
23.211 LABVIEW Programming with Engineering Applications
23.485 Introduction to Solidworks

The Bachelor of Science Degree in Mechanical Engineering Technology is accredited by the Technology Accreditation Commission of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD, 410-347-7700.

degree programs

degree programs

College of Management

The College of Management (COM) is fully accredited at the undergraduate and graduate levels by the Association to Advance Collegiate Schools of Business (AACSB) International and offers a program of study leading to the Bachelor of Science in Business Administration (BSBA). Following the AACSB philosophy, the College endeavors to create the intellectual climate required to offer a dynamic, high-quality undergraduate education in management through a challenging curriculum.

ASSOCIATE OF SCIENCE IN MANAGEMENT

YEARS 1-4: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 65

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the students' own personal time constraints.

FIRST YEAR

FIRST SEMESTER

42.101	College Writing I	3
47.101	General Psychology	3
92.120	Precalculus Mathematics I*	3
- - .- - -	OR Non-COM Elective**	9

SECOND SEMESTER

42.102	College Writing II	3
48.101	Introduction to Sociology	3
92.122	Management Calculus	3
		9

SECOND YEAR

FIRST SEMESTER

43.- - -	History Elective	3
49.201	Economics I (Microeconomics)	3
60.201	Accounting/Financial	3
		9

SECOND SEMESTER

46.- - -	Political Science Elective	3
49.202	Economics II (Macroeconomics)	3
62.201	Marketing Principles	3
		9

THIRD YEAR

FIRST SEMESTER

49.211	Statistics	3
- - .- - -	General Education - Arts & Humanities (AH)	3
60.202	Accounting/Managerial	3
		9

SECOND SEMESTER

63.210	Operations Analysis	3
- - .- - -	General Education - Arts & Humanities (AH)	3
- - .- - -	General Education - Science with Experimental Learning	4 10

FOURTH YEAR

FIRST SEMESTER

61.301	Business Finance	3
66.301	Organizational Behavior	3
- - .- - -	General Education - Science with Experimental Learning	4 10

Please note: 61.301 and 66.301 must be taken as the last classes in the program.

*Students with a very strong mathematics background may elect to substitute a Non-COM (non-business) elective for 92.120 Precalculus. All students are required to take 92.122 Management Calculus.

**A Non-COM Elective is a course outside of the College of Management that is considered by the University as an unrestricted elective.

Note: All BSBA students must successfully complete the required COM filter courses listed below prior to taking any 300 level or 400 level COM courses:

60.201 Accounting/Financial
49.201 Economics I
49.211 Statistics I
92.122 Management Calculus
42.101 College Writing I
42.102 College Writing II
47.101 General Psychology
48.101 Introduction to Sociology

Note: Courses with a 67.- - - prefix are not intended for students in the College of Management degree programs and will not transfer into the Associate of Science in Management or the Bachelor of Science in Business Administration degree programs.

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION

YEARS 1-7: SUGGESTED PROGRAM OF STUDY
TOTAL CREDITS: 120

The following course outline, which lists 3 courses each semester, is only a suggested course load. First-year students should not take more than 1 or 2 courses their first semester. Subsequent course loads may be determined by the students' own personal time constraints.

FIRST YEAR

FIRST SEMESTER

42.101	College Writing I	3
47.101	General Psychology	3
92.120	Precalculus Mathematics I*	3
- -.- - -	or Non-COM Elective**	9

SECOND SEMESTER

42.102	College Writing II	3
48.101	Introduction to Sociology	3
92.122	Management Calculus	3
		9

SECOND YEAR

FIRST SEMESTER

43.- - -	History Elective (AH)†	3
49.201	Economics I (Microeconomics)	3
60.201	Accounting/Financial	3
		9

SECOND SEMESTER

46.- - -	Political Science Elective	3
49.202	Economics II (Macroeconomics)	3
62.201	Marketing Principles	3
		9

THIRD YEAR

FIRST SEMESTER

49.211	Statistics	3
- -.- - -	General Education - Arts & Humanities (AH)†	3
60.202	Accounting/Managerial	3
		9

SECOND SEMESTER

63.210	Operations Analysis	3
- -.- - -	General Education - Arts & Humanities (AH)†	3
- -.- - -	General Education - Science with Experimental Learning	4 / 10

FOURTH YEAR

FIRST SEMESTER

61.301	Business Finance	3
66.301	Organizational Behavior	3
- -.- - -	General Education - Science with Experimental Learning	4 / 10

SECOND SEMESTER

- -.- - -	Non-COM Global Elective***	3
60.331	Cost Management Systems	3
63.301	Management Information Systems	3 / 9

FIFTH YEAR

FIRST SEMESTER

- -.- - -	Non-COM Elective**	3
- -.- - -	COM Elective (300/400 level)	3
- -.- - -	COM Elective (300/400 level)	3 / 9

SECOND SEMESTER

63.371	Operations Management	3
- -.- - -	Non-COM Elective**	3
- -.- - -	COM Elective (300/400 level)	3 / 9

SIXTH YEAR

FIRST SEMESTER

- -.- - -	Non-COM Elective**	3
- -.- - -	COM Elective (300/400 level)	3
- -.- - -	COM Elective (300/400 level)	3 / 9

SECOND SEMESTER

- -.- - -	COM Elective (300/400 level)	3
- -.- - -	COM Elective (300/400 level)	3
- -.- - -	General Education - Science	3
- -.- - -	Non-COM Elective	3 / 12

SEVENTH YEAR

FIRST SEMESTER

- -.- - -	COM Elective (300/400 level)	3
66.490	Strategic Management	3
- -.- - -	COM OR Non-COM Elective	3 / 9

*Students with a very strong mathematics background may elect to substitute a Non-COM (non-business) elective for 92.120 Precalculus. All students are required to take 92.122 Management Calculus.

**A Non-COM Elective is a course outside of the College of Management that is considered by the University as an unrestricted elective.

***A Non-COM Global Elective is a course outside of the College of Management that has international content within the course. A list of selected courses may be obtained from the Management Coordinator.

†No more than two Arts and Humanities electives from one department. "D" and "E" GenEd requirements will be determined by the College of Management.

Note: All BSBA students must successfully complete the required COM filter courses listed below prior to taking any 300 level or 400 level COM courses:

60.201	Accounting/Financial
49.201	Economics I
49.211	Statistics I
92.122	Management Calculus
42.101	College Writing I
42.102	College Writing II
47.101	General Psychology
48.101	Introduction to Sociology

Note: Courses with a 67.- - - prefix are not intended for students in the College of Management degree programs and will not transfer into the Associate of Science in Management or the Bachelor of Science in Business Administration degree programs.

This section of the catalog provides the programs of study required to complete certificates offered through the College of Arts and Sciences, the Francis College of Engineering and the School of Health and Environment.

Students complete the certificate programs at their own pace, usually enrolling in one or two courses each semester. Courses may be taken during the Fall, Spring, Summer or Winter Intersession semesters. Although students have some flexibility in scheduling courses, they should adhere to the appropriate course prerequisites.

certificate programs

A Step-by-Step Guide to Pursuing a Certificate Part-time at UMass Lowell

REQUIRED:

- ☆ Select your desired certificate program and complete the certificate program application for admission. To view a complete list of certificates Continuing Studies offers on a part-time, evening basis, visit http://continuinged.uml.edu/certificates/index.htm
- ☆ Fax the application to (978) 934-3086 or mail the application to:
  University of Massachusetts Lowell
  Admissions/Continuing Studies, Corporate and Distance Education
  Dugan Hall, Room 110
  883 Broadway Street
  Lowell MA 01854-5104
- ☆ Contact the high school or college where you most recently took courses and ask them to send out official transcripts directly to the UMass Lowell Admissions Office at the address above.
- ☆ International students must have their transcripts evaluated by the Center for Educational Documentation. (http://www.cedevaluations.com)
- ☆ Register for courses
- ☆ Once your application and transcripts have been received, you will receive a confirmation letter from Continuing Studies.

RECOMMENDED:

- ☆ Attend a Continuing Studies Open House/Orientation.
- ☆ Speak with a Program Coordinator or Student Support Specialist to review certificate requirements (http://continuinged.uml.edu/general/advising.htm).
- ☆ If you're a veteran, senior citizen or your employer provides tuition assistance, check your eligibility for tuition waivers/remission.
- ☆ Become familiar with University policies and regulations in our catalog.
- ☆ Contact the Continuing Studies Faculty and Student Support Center with any questions at (978) 934-2474, email Continuing_Education@uml.edu or drop by Southwick Hall Room 202 on UML North, Monday through Thursday from 8:30am to 8:00pm and on Friday from 8:30am to 5:00pm.

Certificate Programs: Admissions, Transfer Information and Program Requirements

CERTIFICATE PROGRAMS

UMass Lowell offers a wide variety of credit certificate programs that allow students to obtain marketable skills within a concentrated time frame. These short-term certificate programs consist of a series of courses which, when taken together, demonstrate expertise in a specific area. A wide range of certificate programs are available online - see http://continuinged.uml.edu/online for details.

These certificate programs have been developed through extensive research, and the curricula are reviewed and approved by an advisory board of experts. In most cases, certificate program courses may be applied to a related degree program. To remain abreast of rapidly changing technology, we continuously update these programs to ensure that our students have an opportunity to develop skills that are in high demand in the workplace. Check our website for the most up-to-date information on all of our programs and courses: http://continuinged.uml.edu.

Admissions into Certificate Programs

Students are welcome to take certificate program courses on an individual basis, but must formally apply into the certificate program and complete all of the required courses and electives with a "C" or better in order to receive the certificate. To be considered for acceptance into a certificate program, students must hold a high school diploma or GED.

Transfer Information for Certificate Programs

Only one course may be transferred from another institution of higher education into an undergraduate certificate program. Official transcripts must be sent directly from the transferring institution to the Division of Continuing Studies. Credit will be accepted if it is equivalent to University of Massachusetts Lowell instruction, if it is applicable to the intended program, and if the student has received a grade equivalent to a "C-" (1.700 on a 4.00 scale) or better.

General Requirements for Certificates

All certificate candidates are required to earn a 2.00 ("C") cumulative average in their total course of study, to complete the requisite number of course credits, to conform to the general regulations and requirements of the University, and to satisfy the regulations and academic standards of the colleges that exercise jurisdiction over the certificates for which they are matriculating.

Certificate Completion

After successful completion of all certificate requirements, including a grade point average of 2.00, a student should submit to the Division of Continuing Studies an exit survey and a completed "Petition for the Awarding of a Certificate" form, which is available at http://continuinged.uml.edu/certificates/certificatecompletion.htm. The petition should be accompanied by an official high school transcript or GED and a college transcript if the student is planning to transfer a course. Upon verification of documentation and within 4-6 weeks, the student will be mailed the certificate by U.S. first-class mail. The receipt of the certificate will be noted formally on the student's transcript with an award date of October, February or June.

CERTIFICATE IN CONTEMPORARY COMMUNICATIONS

Available on campus or online

The Contemporary Communications Certificate is intended as an introductory certificate to prepare students for work in a rapidly changing, information-driven workplace. Students will develop skills in research, analysis, writing, graphic presentation of material, and the use of technology as a tool for communication.

This certificate program is interdisciplinary and draws upon the expertise and knowledge of several departments within the University. Many of the courses in this certificate can also be applied towards several other certificates and degrees offered by UMass Lowell.

REQUIRED COURSES (4 plus 2 electives)

Written Communication - Choose 1:

42.221 Writing for Interactive Media
42.224 Business Writing
42.226 Technical and Scientific Communication
42.300 Journalism

Computer-Based Communications - Choose 1:

90.160 Introduction to Information Systems
90.238 Website Development: Microsoft® Expression® Web
90.291 Introduction to DHTML
91.113 Exploring the Internet

Strategic Thinking and Effective Communication - Choose 1:

45.202 Introduction to Logic
46.210 Media and Politics
62.201 Marketing Principles
90.250 E-Commerce on the Web
90.460 Computer Ethics

Multimedia/Graphic Design and Development - Choose 1:

70.291 Introduction to Graphic Design
90.230 Introduction to Multimedia
90.231 Graphics for Multimedia and the World Wide Web
90.232 Desktop Video Production

ELECTIVES (Choose 2 not already taken)

42.221 Writing for Interactive Media
42.224 Business Writing
42.226 Technical and Scientific Communication
42.300 Journalism
45.202 Introduction to Logic
45.205 Argumentation and Rhetoric
45.207 Corporate Communications
45.356 The History, Theory, and Practice of Rhetoric
46.210 Media and Politics
46.316 Politics and Film
62.201 Marketing Principles
70.291 Introduction to Graphic Design
90.160 Introduction to Information Systems
90.230 Introduction to Multimedia
90.231 Graphics for Multimedia and the World Wide Web
90.232 Desktop Video Production
90.238 Website Development: Microsoft® Expression® Web
90.250 E-Commerce on the Web
90.291 Introduction to DHTML
90.460 Computer Ethics
91.113 Exploring the Internet

CERTIFICATE IN GRAPHIC DESIGN AND DIGITAL IMAGING

Over the past decade the graphics industry has moved from predominantly design-for-print to an overwhelming mix of design-for-print, interactive design for CD-ROM and design for the World Wide Web. To succeed in this constantly changing field, graphics professionals need more than a strong foundation in graphic design principles – they need the technical know-how to incorporate their designs into today's media. This certificate program offers students an innovative mix of traditional design courses along with courses in multimedia, website development, desktop publishing and more. Students complete numerous design projects for their portfolios, and get hands-on experience using software such as QuarkXPress®, Adobe InDesign®, Photoshop® and others. Many of the courses in this program may also be applied towards the certificates in Multimedia Applications and Website Design & Development: Design Track.

REQUIRED COURSES (6)

70.291 Introduction to Graphic Design
70.240 Fundamentals of Typography
70.245 Desktop Publishing: Layout and Production
70.262 Digital Imaging and Photography: Photoshop®
70.391 Advanced Graphic Design
70.400 Portfolio Production Seminar

ELECTIVES (CHOOSE 3)

70.264 Computer Graphics & Illustration
70.362 Advanced Digital Imaging
70.376 3D Computer Animation
70.377 Advanced Animation: After Effects
70.379 Website Design: Dreamweaver®
70.384 Advanced Website Design & Development
70.392 Design for Advertising
90.230 Introduction to Multimedia
90.231 Graphics for Multimedia and the World Wide Web
90.238 Website Development: Microsoft® Expression® Web
90.247 Web Authoring: Adobe® Flash®

Note: 70.245 Desktop Publishing usually features either QuarkXPress or InDesign. Refer to the semester course bulletin or website to see which will be covered in the current semester.

CERTIFICATE IN TECHNICAL WRITING

Those with strong writing skills and an aptitude for computers are encouraged to enter this program. Taught by practicing professionals from the high tech industry, students learn to use the most current technologies and processes. Students enrolled in this certificate program can apply for scholarships sponsored by the Society for Technical Communication.

REQUIRED COURSES (4)

42.408 Principles of Technical Writing
42.412 Software Writing
42.413 Advanced Software Writing
90.306 Introduction to XML

ELECTIVES (CHOOSE 2)*

42.221 Writing for Interactive Media
90.227 Developing Interactive Help Systems
90.228 Introduction to Adobe® FrameMaker
90.291 Introduction to DHTML

*Note: This is a partial list of elective courses. For a complete list of courses that may be applied as electives to this program, check our online course listings for computer courses with a 90.- - - prefix. For assistance with your course selection, please contact the Faculty and Student Support Center at (978) 934-2474.

CERTIFICATE IN MULTIMEDIA APPLICATIONS

Available on campus or online

Recent advances in digital technology and fiber optics have revolutionized the way we live and learn. Multimedia is used today in movies, education, entertainment, marketing, advertising, information services, teleconferencing, publishing, interactive television and product demonstration. With the rapid transfer of information and the growing need to present this information in a powerful way, individuals with the skills and knowledge to communicate effectively will flourish in the multimedia industry.

The Multimedia Certificate Program at UMass Lowell is interdisciplinary and draws upon the expertise and knowledge of several departments, colleges and centers within the University, as well as outside expertise from industry professionals.

You can now earn the Certificate in Multimedia Applications on campus or online! Fueled by popular demand and funded in part by a grant from the prestigious Alfred P. Sloan Foundation, the University of Massachusetts Lowell is pleased to announce the migration of its premier Multimedia Certificate Program to an online format.

REQUIRED COURSES (4)

90.230 Introduction to Multimedia
90.231 Graphics for Multimedia and the World Wide Web
90.232 Desktop Video Production
90.247 Web Authoring: Adobe® Flash®

ELECTIVES (CHOOSE 2)

42.221 Writing for Interactive Media
70.262 Digital Imaging and Photography: Photoshop®
70.264 Computer Graphics and Illustration
70.291 Introduction to Graphic Design
70.376 3D Computer Animation
70.377 Advanced Animation: After Effects
70.379 Website Design: Dreamweaver®
70.384 Advanced Website Design and Development
70.385 Streaming Media for the Web
78.201 Introduction to Audio for Multimedia and the WWW
90.227 Developing Interactive Help Systems: Macromedia RoboHelp
90.236 Instructional Design for Interactive Media
90.238 Website Development: Microsoft Expression Web
90.239 Multimedia Scripting Using Macromedia Director's Lingo
90.249 Developing IT Training for the Web
90.250 E-Commerce on the Web
90.291 Introduction to DHTML
90.306 Introduction to XML
90.347 Rich Web Development with Flash (Advanced)
90.348 Developing Dynamic Websites with ColdFusion

CERTIFICATE IN WEBSITE DESIGN AND DEVELOPMENT

Available on campus or online

In our rapidly-evolving, knowledge-based economy, workers are struggling to keep up with the latest technologies and skills. Specifically, in the area of Internet technology, local companies are actively pursuing employees with knowledge and skills in website design and development.

Note: Students participating in this program should have basic computer proficiency. Please refer to the current semester course listings to see whether a course is offered in a PC or MAC lab, or online.

WEB DESIGN TRACK

Note: Students pursuing this track should have basic familiarity with HTML. Those who do not have basic familiarity with HTML are encouraged to take 90.291 Intro to DHTML as one of their electives prior to taking the required courses in this track.

REQUIRED COURSES (4)

90.231 Graphics for Multimedia and the World Wide Web
70.379 Website Design: Dreamweaver®
90.247 Web Authoring: Adobe® Flash®
70.384 Advanced Website Design and Development

ELECTIVES (CHOOSE 2)

70.262 Digital Imaging and Photography: Photoshop®
70.385 Streaming Media for the Web
78.201 Introduction to Audio for Multimedia and the WWW
90.230 Introduction to Multimedia
90.238 Website Development: Microsoft® Expression® Web
90.248 Website Database Implementation
90.250 E-Commerce on the Web
90.291 Introduction to DHTML
90.292 Advanced DHTML
90.302 JavaScript
90.306 Introduction to XML
90.347 Rich Web Development with Flash® (Advanced)
90.348 Developing Dynamic Websites with ColdFusion

WEB DEVELOPMENT TRACK

REQUIRED COURSES (4)

90.291 Introduction to DHTML
90.238 Website Development: Microsoft® Expression® Web
90.248 Website Database Implementation
90.306 Introduction to XML

ELECTIVES (CHOOSE 2)

70.379 Website Design
70.384 Advanced Website Design and Development
70.385 Streaming Media for the Web
78.201 Introduction to Audio for Multimedia and the WWW
90.227 Developing Interactive Help Systems
90.245 Website Server Administration
90.246 Active Server Pages .NET
90.247 Web Authoring: Adobe® Flash®
90.249 Developing IT Training for the Web
90.250 E-Commerce on the Web
90.292 Advanced DHTML
90.301 Java Programming
90.302 JavaScript
90.305 Introduction to Perl
90.347 Rich Web Development with Flash (Advanced)
90.348 Developing Dynamic Websites with ColdFusion

**Note: Other 90.- - - courses may be substituted as electives for the Web Development Track with prior approval from the certificate program coordinator.*

CERTIFICATE IN INFORMATION TECHNOLOGY

Available on campus or online

The need for professionals with a strong information technology background will continue to increase as business, government, schools and other organizations seek new applications for computers and networks in the workplace. This certificate is designed as an introductory program for those who want to explore a broad range of electives in different information technology subject areas before deciding on an area of specialization. This program will serve as a gateway to the other, more specialized certificate programs in information technology.

You can earn the Certificate in Fundamentals of Information Technology entirely online, on campus or by taking a combination of online and on campus courses. For more details, please see our website at http://continuinged.uml.edu/online.

REQUIRED COURSES (2)

90.160 Introduction to Information Systems
90.202 Microsoft® Office*

ELECTIVES (CHOOSE 4)**

Programming Electives

90.211 Introduction to Programming with C, Part I
90.212 Introduction to Programming with C, Part II
90.220 Visual Basic
90.267 C Programming
90.268 C++ Programming
90.269 Advanced C++
90.270 Visual C++
90.364 Problem Solving with C

Database Electives

90.171 Applications Software: Microsoft® Access
90.342 Web-Enabled Database Development
90.474 Relational Database Concepts

Multimedia/Web Electives

90.230 Introduction to Multimedia
91.113 Exploring the Internet

Additional Electives

90.311 Introduction to the UNIX Operating System
90.312 Shell Scripting
90.461 LAN/WAN Technologies

*Students with spreadsheet and database experience can replace the required courses with any of the elective courses.

**Note: This is a partial list of computer elective courses. For the complete list of courses that may be applied as electives to this program, see the current Continuing Studies Course Bulletin for computer courses with the 90.- - - prefix, or contact the Faculty and Student Support Center at (978) 934-2474.

CERTIFICATE IN UNIX

Available on campus or online

More than 300,000 UNIX installations worldwide support over a million users. In comparison with other existing operating systems, UNIX offers more flexibility and a greater set of comprehensive services. Its powerful features permit many users to use one system, and the multitasking capacity allows users to perform several processes at the same time. Its support of open systems architecture and its unique multitasking features have made UNIX one of the most popular operating systems today.

The Certificate Program in UNIX is designed for those currently in the computer industry who want to upgrade their skills, and for those with basic computer literacy who want to enter this fast-growing field. The program curriculum combines theory and practical applications. Students learn skills that are immediately applicable in the workplace as well as C Programming, the language in which most networking software is written.

Many of the courses in the UNIX Certificate Program may be used to satisfy requirements in the Information Technology and Data/Telecommunications Certificate Programs, as well as the A.S. or B.S. Degrees in Information Technology. Note: The UNIX Certificate is available in accelerated and online formats. See the UMass Lowell website at http://continuinged.uml.edu/online for more information.

REQUIRED COURSES (4)

90.267 C Programming
90.311 Introduction to the UNIX Operating System
90.312 Shell Scripting
90.360 Introduction to Data Structures

ELECTIVES (CHOOSE 2)

90.268 C++ Programming
90.269 Advanced C++
90.313 UNIX Internals Overview
90.316 UNIX System Administration
90.318 Advanced UNIX Internals/Tuning
90.319 Introduction to Linux
90.321 Linux System Administration

CERTIFICATE IN DATABASE MANAGEMENT TECHNOLOGIES

New! Oracle 10g Courses-

The Database Management Technologies Certificate program, as part of Oracle Corporation's Academic Initiative (OAI), prepares students for the requirements and rigors of becoming an in-demand Database Administrator or Developer. Centered on the industry-leading Oracle 10g/11i™ product suite, students engage in a progressive learning experience. Hands-on skill building throughout the program will prepare students for challenging and highly rewarding positions in today's data-driven industry. In addition to preparing for Oracle Professional Certification, students may apply all courses towards a degree in Information Technology. Whether pursuing an academic degree, a certificate or both, our Oracle-certified faculty will help students gain valuable technical skills as a marketable enhancement to their overall academic program of study. Students choose three electives from either the Developer or Administrator Tracks, depending upon their specific area of interest.

REQUIRED COURSES (4)

90.450 Database Administration I: Introduction to Oracle 10g
90.453 Database Administration II: Advanced Oracle 10g
90.454 Oracle 10g SQL Development
90.459 PL/SQL I: Introduction to Oracle 10g PL/SQL

Note: Students with experience equivalent to any of the required courses may substitute up to two electives for the required courses, with prior approval of the program coordinator.

CHOOSE 3 ELECTIVES FROM EITHER OF THE FOLLOWING TWO TRACKS:*

DEVELOPER TRACK ELECTIVES (CHOOSE 3)

90.448 Oracle 10g Portal Development
90.449 Oracle 10g Forms and Reports
90.467 PL/SQL II: Advanced Oracle 10g PL/SQL
90.474 Relational Database Concepts

ADMINISTRATOR TRACK ELECTIVES (CHOOSE 3)

90.443 Introduction to Client/Server Computing
90.455 Database Administration III: Oracle 10g Projects
90.466 Oracle 10g Data Warehousing
90.479 Oracle IIi Applications DBA

*Note: If you would like to, you may choose one elective course from one of the tracks and two elective courses from the other track, as long as you take a total of three elective courses in addition to the required courses above.

CERTIFICATE IN DATA/TELECOMMUNICATIONS

Available on campus or online

The Certificate Program in Data/Telecommunications trains participants for positions as entry-level network administrators, LAN technicians and system analysts responsible for networking functions in large or small companies. Many of the courses in this certificate program can be applied towards the A.S. or B.S. Degree in Information Technology.

REQUIRED COURSES (5)

90.267 C Programming
90.461 LAN/WAN Technologies
90.462 TCP/IP and Network Architecture
90.457 Network Security
90.464 Network Management

CERTIFICATE IN SECURITY MANAGEMENT AND HOMELAND SECURITY

Available online*

Since September 11th, the U.S. Department of Labor has been predicting that the employment of security management personnel will grow faster than all other occupations due to the threat of terrorism. The Certificate Program in Security Management and Homeland Security, offered under the auspices of the Criminal Justice Department in concert with Continuing Studies, Corporate and Distance Education, is designed for personnel working in the areas of public safety, security management and law enforcement; executives in corporations responsible for overseeing in-house security programs; and information technology professionals. Criminal justice students interested in enhancing their future career prospects may also benefit from this program by broadening their studies to encompass security within private industry.

All courses can be applied toward UMass Lowell's part-time Bachelor's Degree in Criminal Justice.

REQUIRED COURSES (4)

44.115 Introduction to Homeland Security
44.241 Physical Security
44.312 Security Management
90.385 Introduction to Information Security (Cyber Security)

ELECTIVES (CHOOSE 2)

44.212 Weapons of Mass Destruction
44.234 Criminal Law
44.248 Terrorism
44.326 Domestic Terrorism and Hate Crimes
44.342 Criminal Profiling
44.343 Forensic Psychology
44.380 Selected Issues in Criminal Justice

**Note: Some of these courses are also offered on campus. See our current course listings on our website for a list of available on campus courses.*

CERTIFICATE IN PARALEGAL STUDIES

Available on campus or online

The Certificate Program in Paralegal Studies offers a unique mix of legal theory and practical skills applications. One special feature of specific interest in the program is the Paralegal Practicum, which can provide students with real-world experience in research, drafting, ethics and client interaction. All of the courses in the certificate program may be applied to the B.S. Degree in Criminal Justice, Paralegal Option.

REQUIRED COURSES (4)

41.103 Introduction to Paralegal Studies
41.370 Real Estate Law
41.387 Legal Research Methods
41.390 Litigation

ELECTIVES (CHOOSE 2)

41.363 Corporate and Property Law
41.367 Environmental Law
41.376 Family Law
41.381 Women and the Law
41.392 Wills, Trusts, and Estates
41.497 The Paralegal Practicum

CERTIFICATE IN SPANISH AND LATIN AMERICAN STUDIES

The Certificate in Spanish and Latin American Studies offers proficiency in the Spanish language as well as exposure to the literature and culture of Latin America and Spain. It is valuable to language teachers seeking additional language certification in Spanish, as well as to engineers, consultants, business people and others for whom language proficiency and cultural information are crucial for successful business operations in Spanish-speaking countries and the United States.

REQUIRED COURSES (2)

54.211 Intermediate Conversational Spanish I or equivalent
54.212 Intermediate Spanish II and Culture or equivalent

ELECTIVES (CHOOSE 4)

54.310 Spanish Civilization and Culture
54.313 Fieldwork in the Spanish Community*
54.315 Latin American Civilization and Culture
54.320 Special Topics in Spanish Studies*
54.335 Spanish Women Writers
54.401 Selected Authors*
54.412 Short Story in Latin America

*Course may be repeated

CERTIFICATE IN NUTRITION

With the focus on health, fitness and disease prevention, this certificate is designed to expand knowledge related to the body's handling of nutrients and to enable students of other disciplines to relate this knowledge to their specific fields.

The Certificate Program in Nutrition serves four distinct audiences: 1) students in UMass Lowell's School of Health and Environment who are not eligible to obtain a minor in a related field, 2) students with Associate's Degrees in science or clinical areas, 3) students in science-related Bachelor's Degree programs seeking employment opportunities in health-related industries and community-based programs, and 4) individuals with no previous experience who would like to use the certificate as a stepping stone towards a formal degree in nutrition, dietetics or nutritional sciences.

REQUIRED COURSES (4)

35.206 Human Nutrition
35.207 Fitness and Nutrition OR 36.372 Obesity and Weight Control
36.371 Advanced Human Nutrition
36.481 Clinical Nutrition

ELECTIVES (CHOOSE 1)

35.207 Fitness and Nutrition OR 36.372 Obesity and Weight Control
36.350 Human Biochemistry
36.406 Biochemistry of Lipids
36.463 Vitamins & Minerals
36.472 Nutrition & Gene Expression

CERTIFICATE IN COMPUTER-ASSISTED MANUFACTURING

Available on campus or online

The Certificate Program in Computer Assisted Manufacturing is designed for those who have basic drawing experience and who want to expand their knowledge in the latest industry-standard CAD software applications that are in use today. The courses in this certificate program may also be applied towards UMass Lowell's Bachelor's Degree in Mechanical Engineering Technology.

Note: Students who do not have drawing experience must take 23.101 Engineering Graphics (not currently offered online at UMass Lowell) or equivalent from an accredited institution of higher education.

REQUIRED COURSES (4)

23.200 Computer Aided Drafting - AutoCAD
23.480 Computer Aided Design - AutoDesk Inventor
23.484 Introduction to Pro|ENGINEERING
23.485 Introduction to SolidWorks

CERTIFICATE IN COMPUTER ENGINEERING TECHNOLOGY

The Certificate Program in Computer Engineering Technology is designed to provide students with a broad-based knowledge of digital electronics, microprocessors and advanced digital technologies. Students enrolled in the program must complete the seven courses listed below. The curriculum includes engineering science and design courses that provide a balanced view of hardware, software, application trade-offs and the basic modeling techniques used in computer engineering. All the courses in this certificate program can be applied towards the B.S. Degree in Electronic Engineering Technology.

REQUIRED COURSES (7)

17.341 Logic Design I and Lab
17.342 Logic Design II and Lab
17.353 Digital Electronics
17.383 Microprocessors A
17.384 Microprocessors B
90.267 C Programming
90.268 C++ Programming

CERTIFICATE IN ELECTRONICS TECHNOLOGY

The Certificate Program in Electronics Technology is designed to provide students with a broad-based knowledge of circuit theory and electronics, with laboratory work included to ensure that good hands-on experience is acquired along with the deep understanding of fundamental and changing technologies. All the computer courses in this certificate program can be applied towards the A.S. or B.S. Degree in Electronic Engineering Technology.

REQUIRED COURSES (8)

17.213 Circuits I
17.214 Circuits II and Laboratory
17.215 Circuits III and Laboratory
17.216 Circuits IV
17.355 Electronics I & Laboratory
17.356 Electronics II & Laboratory
17.357 Electronics III & Laboratory
17.358 Electronics IV & Laboratory

CERTIFICATE IN PLASTICS ENGINEERING TECHNOLOGY

The Plastics Engineering Technology Certificate provides professional training in plastics industry theory and technology. Students are given practical instruction applicable to materials, processing and design engineering. Courses are taught by the Department of Plastics Engineering's staff of international experts.

This program is designed to serve students already working in positions in plastics or packaging who need formal education in their work areas.

REQUIRED COURSES (5)

27.201 Plastics Material Science I (Commodity Thermoplastics)
27.202 Plastics Material Science II (Engineering Thermoplastics)
27.219 Introduction to Plastics Processing
27.331 Injection Molding
27.345 Principles of Extrusion

ELECTIVE COURSES

Choose 2 plastics engineering technology courses with a 27.- - - prefix. See current course listings on our website for a list of available 27.- - - courses.

CERTIFICATE IN MANUFACTURING TECHNOLOGY

The Certificate Program in Manufacturing Technology is designed for technical personnel, supervisors and managers involved in the many manufacturing technology disciplines that require a broad understanding of manufacturing processes, automation methods and environments. Focusing on the technology of manufacturing processes, the program is designed to correlate theoretical knowledge and the real-world environment of manufacturing technology.

REQUIRED COURSES (7)

23.101 Engineering Graphics
23.200 Computer Aided Drafting
23.301 Manufacturing Technology Laboratory
23.305 Manufacturing Processes
23.314 Manufacturing Productivity
23.414 Engineering Economics
23.419 Computer Aided Manufacturing

CERTIFICATE IN WATER TREATMENT

Due to new EPA regulations, within the next decade numerous communities will be constructing and operating new drinking water facilities in Massachusetts. Personnel in charge of these facilities will need to be certified. The Certificate Program in Water Treatment provides the most effective way to prepare for the water treatment certification exams.

Courses in this program are intended to provide students with the technical knowledge to operate and maintain physical/chemical water treatment facilities and water distribution systems. The Certificate in Water Treatment is for individuals seeking to enter the field of water treatment and for those currently working in the area of water treatment and distribution.

REQUIRED COURSES (7)

15.131 Environmental Chemistry I
15.132 Environmental Chemistry II
15.272 Water Supply & Treatment Operations I
15.274 Water Works Operations Lab I
15.355 Water Distribution Systems
15.372 Water Supply and Treatment Operations II
15.152 Water Biology

CERTIFICATE IN WASTEWATER TREATMENT

The demand for municipal and industrial wastewater treatment plant operators is expected to increase well into the next decade. In response to the demand, UMass Lowell is offering the Certificate Program in Wastewater Treatment.

This certificate program prepares students for all levels of state certification required to manage and operate a modern wastewater treatment facility. The program consists of seven courses which, when taken together, demonstrate expertise in the area of wastewater treatment. The program is designed for individuals seeking to enter the field of wastewater treatment and for those in the field who want to upgrade their skills or achieve a higher level of state certification. Courses in the program cover both municipal (biological) plants and industrial (physical/chemical) treatment plant operations.

REQUIRED COURSES (7)

15.131 Environmental Chemistry I
15.132 Environmental Chemistry II
15.261 Wastewater Treatment Plant Operations I
15.263 Wastewater Operations Lab I
15.280 Industrial Waste Treatment
15.361 Wastewater Treatment Plant Operations II
15.152 Water Biology

CERTIFICATE IN LAND SURVEYING

Land surveyors manage one or more survey parties who measure distances, directions and angles between points and elevations of points, lines and contours on the earth's surface. They research legal records and look for evidence of previous boundaries. They record the results of the survey, verify the accuracy of data and prepare plans, maps and reports. Surveyors who establish official boundaries must be licensed by the state in which they work.

New technology and government regulations are changing the nature of work of surveyors and survey technicians. Surveyors will need to upgrade their knowledge and skills in these new regulations and technologies and become familiar with environmental regulations on the local, state and federal levels.

The Certificate in Land Surveying can prepare students for licensure in Massachusetts, when combined with additional state requirements. Many of the courses may be applied to the A.S. Degree in Civil Engineering Technology: Surveying Option and/or to the B.S. Degree in Civil Engineering Technology.

REQUIRED COURSES (6)

92.123 Precalculus Mathematics II
23.101 Engineering Graphics
15.123 Surveying I
15.124 Surveying II
15.262 Legal Aspects of Land Surveying
15.299 Surveying III

course descriptions

This portion of the catalog contains course descriptions for most of the courses offered through Continuing Studies. Courses are listed numerically by their course numbers. If you have difficulty locating a particular course description, please check our website, which is updated regularly with new course descriptions. Otherwise, please contact the Faculty and Student Support Center for additional information.

Subject/Department Areas

If you prefer to search for a particular course by subject or department area, please check the subject list below for the two-digit course number prefix. Then look for your course by the first two digits of the course number in the course descriptions.

Accounting 60.- - -/67.- - -
Art 70.- - -
Art History 58.- - -
Biological Sciences 81.- - -/83.- - -
Chemistry 84.- - -/86.- - -
Civil Engineering Technology 15.- - -
Clinical Laboratory Sciences 35.- - -
Computer Mathematics 90.- - -/92.- - -
Computer Programming 90.- - -/91.- - -/92.- - -
Computer Science 91.- - -
Criminal Justice 44.- - -
Data/Telecommunications 90.- - -/92.- - -
Economics 49.- - -
Electronic Engineering Technology 17.- - -
English 42.- - -
Environmental Sciences
85.- - -/87- - -/88.- - -/89.- - -
Finance 61.- - -
Graphic Design 70.- - -
Hazardous Waste
Management 15.- - -/41.- - -/86.- - -
History 43.- - -
Information Technology 90.- - -
Interdisciplinary Courses 59.- - -
Languages
50.- - -/51.- - -/52.- - -/53.- - -/54.- - -/56.- - -
Legal Studies 41.- - -
Management 62.- - -/63.- - -/66.- - -/69.- - -
Manufacturing 17.- - -/23.- - -
Mathematics 90.- - -/92.- - -
Mechanical Engineering Technology 23.- - -
Multimedia 42.- - -/70.- - -/90.- - -
Music 71.- - -/74.- - -
Nutrition 30.- - -/35.- - -/36.- - -/83.- - -
Paralegal Studies 41.- - -/44.- - -
Philosophy 45.- - -
Physics 95.- - -/96.- - -/99.- - -
Plastics 27.- - -
Political Science 46.- - -
Psychology 47.- - -
Sociology 48.- - -
Technical Writing 42.- - -
Water/Wastewater Treatment 15.- - -/86.- - -
Website Design &
Development 70.- - -/90.- - -

INDEX OF COURSES BY TITLE

D

E

F

G

M

N

O

P

Q

R

S

T

U

V

W

10.347 ELEMENTS OF THERMODYNAMICS AND HEAT TRANSFER

Studies the development of the first and second laws of thermodynamics. Ideal gases. Properties of substances. Entropy, availability and lost work. Steam cycles, gas power-cycles, and vapor-compression refrigeration. Dimensionless parameters. Heat transfer by: steady state conduction, convection and radiation. For Civil Engineers, Electrical Engineers and Industrial Management majors. Prerequisite(s): 92.132, 95.141. Credits: 3 (3.0)

14.203 STATICS (ALTERNATE 22.211)

Discusses vector concepts of forces and moments of forces. Static equilibrium of particles, rigid bodies and simple structures. Static friction forces. Geometric properties of sections. Prerequisite(s): 92.132, 95.141, 96.141. Credits: 3 (0.0)

14.204 STRENGTH OF MATERIALS (ALTERNATE 22.212)

Introduces the concept of stress and strain at a point, stress-temperature relationships, force and deformation analyses of bodies under axial, shearing, flexural, torsional and combined loadings, shear and bending moment diagrams, and Euler Columns. Prerequisite(s): 14.203. Credits: 3 (3.0)

14.205 DYNAMICS (ALTERNATE 22.213)

Vector development of kinematics of particles and rigid bodies with respect to fixed and moving coordinate systems of one,two, and three dimensions. The dynamics of particles, systems of particles, and rigid bodies. Angular momentum and the inertial properties of rigid bodies. Energy, impulse and momentum methods. Prerequisite(s): 14.203, 92.132. Credits: 3 (3.0)

15.113 COMPUTER-AIDED DESIGN AND DRAFTING

This course demonstrates CAD concepts using both class discussion and laboratory work. Using interactive computer graphics workstations, students will create several civil/architectural drawings that involve the processes of inserting and modifying lines, arcs, text, dimensions, and other geometric entities. AutoCAD is used in this course. Prerequisite(s): 23.101 or related experience. Credits: 2 (3.0)

15.114 3D COMPUTER AIDED DESIGN

An introductory 3D design and presentation course using AutoCAD. The student will learn 3D object creation and manipulation as well as scene creation and rendering. A course in 3D CAD will aid the individual in the design process, and it also can be used to present ideas to technical and nontechnical audiences. Prerequisite(s): 15.113 or equivalent. Credits: 2 (3.0)

15.123 SURVEYING I

This course is devoted to the study of basic principles of geomatics through class instruction and hands-on field work. Students will develop and retain a basic understanding of computations made in topographic mapping, property surveys, construction layout, cross-section designs, etc. Practical, real-world examples will be used to model the topics of each lecture. The concepts presented in this course directly relate to numerous other civil engineering fields. Prerequisite(s): 92.123, 23.101. Credits: 4 (6.0)

15.124 SURVEYING II

This course is devoted to the study of geomatics through class instruction and hands-on field work. Students will develop and retain a more advanced understanding of computations made in topographic mapping, property surveys, roadway layout, construction layout, cross-section designs, subdivisions, etc. Practical, real-world examples will be used to model the topics of each lecture. The concepts presented in this course directly relate to numerous other civil engineering fields. Prerequisite(s): 15.123, 92.123, 23.101. Credits: 4 (6.0)

15.131 ENVIRONMENTAL CHEMISTRY I

Basic chemistry theory, including chemical reactions and equations, are the focus of this course. An introduction to the structure of water and its characteristics, its impurities, and the chemical treatment schemes that have been devised to deal with each will also be addressed. Credits: 3 (3.0)

15.132 ENVIRONMENTAL CHEMISTRY II

Serves as a continuation of 15.131. This course covers specific water and wastewater treatment practices, such as chlorination, coagulation, filtration and absorption. A focus on the analytical techniques for the particular parameters of interest will also be addressed. Wet chemistry, as well as instrument methods, will be discussed and demonstrated during laboratory sessions. These sessions will complement the lecture material. Prerequisite(s): 15.131. Credits: 3 (3.0)

15.152 WATER BIOLOGY

Bio(life)-logy(study of) in water environments will be explored starting from the simple cell to multi-cellular organisms. With a review of the chemistry of water and an understanding of the importance of water in living systems, a better understanding of the interrelationship of both biology and chemistry will be attained. Demonstrations and individual presentations as well as lab-work will enhance the understanding of this topic. Problem-solving of a specific work-related situation will be assigned and the student will trouble-shoot, explore, and attempt to solve his/her biology problem. Credits: 3 (3.0)

15.154 WATER BIOLOGY II

Explores the cycles of nature that are involved in the ecosystem with an emphasis on their environmental significance and their connection with water and wastewater treatment. Disinfection, biological treatment, analytical techniques, and sample collection methods will be discussed with a focus on troubleshooting and problem solving in the field. The health effect of biochemical agents such as carcinogens and hormone mimetics as well as the biological species cryptosporidium, giardia, coliforms, and viruses will be explained. Prerequisite(s): 15.152. Credits: 3 (3.0)

15.224 MATERIALS/STRUCTURAL LABORATORY

This lab provides an experimental study of testing construction materials and measurement techniques. Construction materials tested are steel, concrete, etc. Materials will also include flexor test of a beam and loading of a truss. Prerequisite(s): 15.251, 15.253. Credits: 1 (3.0)

15.237 STATICS

Statics is the study of objects in equilibrium and the forces acting on that object. Students will develop mathematical models to predict and analyze forces and their distributions with the use of the free body diagram. The concepts presented in this course directly relate to other mechanical and civil engineering fields. Students must have a basic understanding of trigonometry, geometry, physics and calculus. Prerequisite(s): 92.125, 99.131. Credits: 3 (3.0)

15.238 DYNAMICS

This course introduces the student to the kinematics and kinetics of particles, systems of particles, and rigid bodies. This course covers the basic methods of analysis including Newton's 2nd Law (force, mass, acceleration), Work and Energy, and Impulse and Momentum. Prerequisite(s): 15.237 or 23.221. Credits: 3 (3.0)

15.239 STRENGTH OF MATERIALS

This course discusses the principles of strength of materials and the relationships between externally applied forces and internally induced stresses in various types of structural and machine members and components. Included are axial, torsional, and flexural loadings, stress-strain relationships, deformation of materials, elastic deformation, principal stresses, temperature effects, Mohr's circle, shear and bending moment diagrams, the design of beams, and the deflection of beams. Prerequisite(s): 15.237 or 23.221. Credits: 3 (3.0)

15.242 STEEL DESIGN I

This course provides an introduction to the analysis and design of structural steel elements based on the AISC LRFD Specification. Structural elements covered include tension members, columns, beams, and beam-columns. Types of structures considered include simple and continuous beams, and braced and unbraced frames. Strength, serviceability, design economy, and good design practice principles are discussed. The use of computer software to perform routine analysis and design tasks is reviewed and examples provided. Prerequisite(s): 15.237 and 15.239. Credits: 3 (3.0)

15.246 HYDRAULICS

This course examines properties of fluids; fluid statics: pressure, forces, manometers, buoyancy; basics of fluid flow: mean velocity, continuity equation; Bernoulli equation; energy equation: pumps, turbines; fluid measurements; momentum and forces in fluid flow; steady, incompressible flow in conduits: laminar and turbulent flow, friction factor, minor losses; forces on immersed bodies: lift and drag; steady flow in open channels: Manning's equation. Prerequisite(s): 99.131,15-237 or 23-221. Credits: 3 (3.0)

15.247 HYDRAULICS LABORATORY

This lab presents the fundamentals of measurements in the general area of hydraulics. Laboratory topics include friction losses in pipes and valves, flow through venturi and orifice, hydraulic ram, study of open channel flow, etc. Prerequisite(s): 15.246. Credits: 1 (3.0)

15.251 STRUCTURAL ANALYSIS I

This course presents an introduction to the design and analysis of structural elements and systems including dead load, live load, and various load combinations. Topics covered include statics of structures, reactions, forces, free-body diagrams, influence lines and equations of condition for stability and determinacy of beams, frames, cables and trusses. There is an emphasis upon development of analytical skills through problem solving. Prerequisite(s): 15.239. Credits: 3 (3.0)

15.253 REINFORCED CONCRETE I

Introductory course to the analysis and design of reinforced concrete elements based on ACI building code requirements. Structural members covered include rectangular beams, T-beams, doubly reinforced beams, one-way slabs, and columns. Topic discussion includes strength requirements, serviceability, design economy, and good design practice principles. Use of computer software to perform routine analysis and design tasks is reviewed and examples provided. Prerequisite(s): 15.239. Credits: 3 (3.0)

15.254 SOIL MECHANICS I

This course provides an elementary treatment of the physical properties of soil, such as bearing capacity, shearing strength, seepage, soil pressure, and settlement. Also covers the subsurface investigation and application of soil properties to soil classifications. Prerequisite(s): 15.239. Credits: 3 (3.0)

15.257 HIGHWAY ELEMENTS

Highway Elements is the study of a variety of issues associated with the development, design and construction of transportation projects. Students will develop and retain a basic understanding of the environmental process and alternatives analysis as well as design considerations. Practical, real-world examples will be used to model the topics of each lecture. The concepts presented in this course directly relate to numerous other civil engineering fields. Prerequisite(s): 15.124. Credits: 3 (3.0)

15.261 WASTEWATER TREATMENT PLANT OPERATIONS I

This course discusses state rules and regulations, preliminary treatment, primary treatment, secondary treatment, disinfection, sludge handling and disposal. The primary emphasis is on the activated sludge process. Operational control processes are discussed in detail and "hands-on" visits to local wastewater treatment facilities are included. Pre/ Corequisite(s): 15. 263. Credits: 3 (3.0)

15.262 LEGAL ASPECTS OF LAND SURVEYING

This course covers topics such as property law, property transfer, boundary law, property descriptions and titles, survey plats, water law, liability and litigation, professional ethics and standards, and land information systems. Prerequisite(s): 15.123. Credits: 3 (3.0)

15.263 WASTEWATER OPERATIONS LABORATORY I

In this lab, fundamental principles of biological wastewater treatment are explained. Students perform basic wet chemistry tests for monitoring and operating a biological wastewater treatment system. Co/ Prerequisite(s): 15.261, 15.356, or 15.358. Credits: 3 (3.0)

15.272 WATER SUPPLY AND TREATMENT OPERATIONS I

This course provides exposure to a wide variety of water treatment methods, including those associated with drinking water and the processing of water needs of such industries as electronics, medical, pharmaceutical and food processing. Treatment methods include coagulation, flocculation, sedimentation, filtration, chlorine disinfection, membrane separation, including reverse osmosis, electrodialysis, etc. Concepts are stressed and design problems are discussed. Prerequisite(s): 15.131. Credits: 3 (3.0)

15.274 WATER WORKS OPERATIONS LAB I

This course introduces the student to the fundamental laboratory equipment and apparatus used in a water treatment facility. The following chemical test will be performed: odor, color, turbidity. jar tests, pH, chlorine residuals, acidity, alkalinity, hardness, chlorine, iron, manganese, phosphate, aluminum, nitrates, heavy metals, and organics. Microscopic analysis and coliform test will also be conducted to prepare the operator for a thorough understanding of the water treatment process. Prerequisite(s): 15.131. Credits: 1 (3.0)

15.280 INDUSTRIAL WASTE TREATMENT

This course examines the state and federal regulations for industrial wastewater treatment. Basic chemistry is covered and physical-chemical treatment for neutralization, oxidation-reduction, metals removal, and cyanide destruction is reviewed in detail along with numerous sample problems. Common industrial waste treatment processes such as filtration, ion exchange, activated carbon, ultra filtration reverse osmosis and other membrane filtration techniques are presented. Chemical feed systems, polymer feed systems, chemical dosage calculations, jar testing, sludge handling, and dewatering methods and sludge calculations are also discussed. Credits: 3 (3.0)

15.299 SURVEYING III

This course presents an introduction to geodesy, geographic coordinates (latitude and longitude), State Plane Coordinate System of 1983 (Lambert Conformal Conic Projections and Transverse Mercator Projection), field astronomy for celestial observations including the use of an ephemeris to determine astronomic north from observing the sun, Polaris (the North Star), and various other stars. In addition, the course covers error theory, precision and accuracy, probability curves, standard error and other statistics, propagation of errors in surveying and sources of error, field method of determining accuracy and precision of electronic distance measuring (EDM) devices. Prerequisite(s): 15.124. Credits: 3 (3.0)

15.315 LAND DEVELOPMENT DESKTOP

Learn AutoCAD's Land Development Desktop, an invaluable design and drafting tool for surveyors, land planners and civil engineers. Learn to take a project from survey data, base plan creation, existing conditions terrain modeling and contours to proposed roadway horizontal alignment, profile and cross sections, to site grading, proposed condition terrain modeling, contours and earthwork quantities for cost estimating. Also learn general land development desktop skills and features that simplify/enhance everyday AutoCAD drafting tasks. Prerequisite(s): 15.113 Credits: 3 (3.0)

15.340 HAZARDOUS WASTE MANAGEMENT

Review of basic chemistry related to hazardous wastes and history of hazardous waste management in the U.S. Additional scope includes discussion of sampling of contaminated media and analytical methods; waste accumulation, storage and disposal options as required by RCRA; permitting of facilities and DOT requirements for waste handling. Waste treatment technologies; site assessment; risk assessment; waste minimization and environmental audits are also discussed. Prerequisite(s): 15.131. Credits: 3 (3.0)

15.352 STRUCTURAL ANALYSIS II

A continuation of 15.251, classical methods for the analysis of statically indeterminate structures including beams, frames, and trusses are presented. The calculation of deflections for these structures is also presented. Methods for deflection analysis include the moment area theorems, conjugate beam method, elastic load method and energy methods, including virtual work. The slope-deflection method and moment distribution method for the analysis of beams and frames is also presented. The solution of trusses, beams, and frames by a general purpose structural analysis computer program is illustrated. Prerequisite(s): 15.251. Credits: 3 (3.0)

15.353 FORENSIC ENGINEERING

This course is a survey of forensic engineering with particular emphasis on using engineering science and technology to investigate and reconstruct failures of engineered systems. Topics include qualifications of the forensic engineer, the scientific method, failure hypotheses, levels of confidence, physical evidence, field investigation techniques, examination and testing, codes and standards, and personnel safety. Other topics include ethics, the hired gun, junk science, the legal process, introduction to expert witness testimony, trial exhibits, Frye and Daubert decisions, bias, forensic engineering practice, and engineering reports. Credits: 3 (3.0)

15.355 WATER DISTRIBUTION SYSTEMS

This course exposes the student to a broad spectrum of topics within the public water works profession with the exception of water treatment and pumps. All aspects of the water works industry are covered including: governmental regulation of the industry (SDWA), pipe installation and pipe maintenance, ground and surface water supply sources, their characteristics and maintenance, backflow prevention, certain management topics, public and media relations, theory of water rate development, public utility regulation theory. Particular emphasis is placed on hydraulic, sizing water mains, simple computer analysis, skeletonizing distribution systems, equivalent pipes, hydraulic grade line. Credits: 3 (3.0)

15.356 WATER TREATMENT DESIGN

This course will examine the design and maintenance of a water treatment plant. From site location to operation and maintenance, the sequences will be discussed along with various design options at each level of construction. Environmental concerns will be addressed and real-life design problem situations will be assigned to students. Care and maintenance issues relevant to the treatment plant along with security

measures will also be discussed. Prerequisite(s): 15.246 and 15.131. Credits: 3 (3.0)

15.358 WASTEWATER TREATMENT

This course presents the basic principles of designing wastewater treatment and residuals processing unit operations, as well as concepts of effluent and residuals disposal and reuse. Physical, biological and chemical treatment options are introduced. Removal mechanisms and loading rates for wastewater and residuals treatment on a unit operation basis are identified. Entire treatment trains as well as basic concepts of effluent and residuals disposal and/or reuse are discussed. Prerequisite(s): 92.110, 15.356. Credits: 3 (3.0)

15.361 WASTEWATER TREATMENT PLANT OPERATIONS II

This course serves as a continuation of 15.261. The operation and maintenance of biological processes is emphasized. Phosphorous removal and nitrification are covered. Two stage activated sludge and batch reactors are discussed. An introduction to pumps, control systems, and physical chemical treatment of industrial wastes is included. Two field trips to advanced wastewater treatment facilities are conducted on Saturdays. Prerequisite(s): 15.261, 15.263. Corequisite 15.363. Credits: 3 (3.0)

15.363 WASTEWATER OPERATIONS LABORATORY II

The typical chemical analysis performed at advanced municipal treatment plants are performed by students. The techniques of volumetric, gravimetric and spectrophotometric measurement are taught through demonstration and experimentation. Discussions include the storage of common pollutants, the need for quantitation, and common abatement technologies. This is a "hands-on" laboratory where students work in small groups conducting analyses on wastewater samples. Prerequisite(s): 15.261, 15.263. Corequisite 15.361. Credits: 1 (3.0)

15.372 WATER SUPPLY AND TREATMENT OPERATIONS II

This course serves as a continuation of 15.272, covering the following topics as related to the water treatment field: corrosion control, oxidation and aeration, use of ozone, chlorine dioxide, potassium permanganate, iron and manganese, carbon, softening, instrumentation and controls, reverse osmosis, ultrafiltration, electrodialysis, distillation and UV, and energy management. Prerequisite(s): 15.272. Credits: 3 (3.0)

15.374 WATER WORKS OPERATIONS LABORATORY II

This "hands-on" lab course has the students working in small groups of 2 or 3 per group. Laboratory set-up with necessary apparatus, preparation of reagents and solutions, and learning to use various instruments will all be addressed. Analyses of wet chemistry will be the goal through these tests: fluoride, fecal coliform. phosphate, algae ID and control, microscopic analysis, filterability, TKN, TOC, heavy metals. AA apparatus, activated carbon assessment and laboratory quality assurance. Prerequisite(s): 15.274. Credits: 1 (3.0)

15.378 AIR QUALITY MONITORING

Hands-on experience operating equipment typical of an EPA monitoring station. History of air pollution and air pollution legislation. Clean Air Act Amendments of 1990. Air quality management techniques. Meteorology. Physical principles used to detect and measure pollutants in the ambient air. Laboratory experiments will involve calibration and setup of the Multigas Calibration System, CO2, SO2, Nox, CO, and particulate monitors. Prerequisite(s): 15.131. Credits: 3 (3.0)

15.383 STEEL DESIGN II

A continuation of 15.242, an introduction to the analysis and design of building structural steel elements based on the AISC LRFD Specification is presented. Focus is on general bolted and welded connections and building shear-type connections. Analysis and design of building composite floor systems is also made. Comparison is made between traditional analysis and design methods and use of computer software. Prerequisite(s): 15.242. Credits: 3 (3.0)

15.388 PUMPS AND COMPRESSORS

This course covers the operation and maintenance of various types of pumps such as centrifugal, positive displacement, rotary, airlift and chemical feed. Pumping hydraulics, control systems, mechanical seals, mechanical packing, bearings, motors and pump piping systems will be discussed in detail. Testing and troubleshooting the operation of a centrifugal pump system utilizing pump curves and system head curves will be covered in detail. The operation and maintenance of compressors and blowers, their application, and troubleshooting will be covered. Several types of compressors will be described to include: positive displacement, reciprocating, rotary screw, liquid ring and the centrifugal type. Prerequisite(s): Basic math and knowledge of hydraulics. Credits: 3 (3.0)

15.391 REINFORCED CONCRETE DESIGN II

This is a continuation of 15.253 Reinforced Concrete Design I. Topics covered include design of wall and column footings, cantilever retaining wall design, bearing and shear wall design, torsion considerations, two-way slab design, and simple formwork design. Reference is made to the benefits of using computer software in the design process. Examples of good and bad design practice pertinent to the lecture topic are provided and discussed. Prerequisite(s): 15.253. Credits: 3 (3.0)

15.392 SOIL MECHANICS II

This course serves as a continuation of 15.254 with emphasis on the application of principles. Design of foundations such as caissons, spread footings, and piles is presented. The design of retaining structures and the treatment of embankments are also covered. Prerequisite(s): 15.254. Credits: 3 (3.0)

15.394 SOIL MECHANICS LAB

Presents common soil laboratory tests including soil classifications, Atterberg limits, strength and compressibility tests. Prerequisite(s): 15.254. Credits: 1 (3.0)

15.396 GROUNDWATER RESOURCES

This course provides an introduction to the basic concepts of groundwater hydrology, starting with a discussion of the origin and occurrence of groundwater, the hydrologic cycle, and basic geology as applies to groundwater hydrology. Essential concepts of groundwater hydrology will be covered, including aquifer parameters, Darcy's Law, gradients, flow nets and equations of groundwater flow. Methods of determining aquifer hydrologic characteristics will be discussed including a review of the field investigation methods. Groundwater models including its benefits and limitations will be discussed. Prerequisite(s): 92.125. Credits: 3 (3.0)

15.410 FUNDAMENTALS OF CONSTRUCTION INSPECTION

Students will review, classify, evaluate, and observe the specifications for construction methods, materials, components, and final products of typical municipal infrastructure within our public systems. Students will obtain samples of the various requirements for each network, from their resident community, for evaluation and discussion. The UMASS Lowell campus infrastructure shall serve as a prototype for definition, observation, and classification field trips. Each student shall compile a basic framework specification log for use on future construction observation. Credits: 3 (3.0)

15.420 SOLID WASTE MANAGEMENT

The course examines science, engineering and management issues pertaining to the collection, management and disposal of municipal solid wastes. Municipal waste generation patterns and characteristics of solid wastes are reviewed as an introduction to the course. Issues related to planning for siting of solid waste management facilities are discussed. Waste collection and transfer; transfer stations; volume reduction and processing; biosolids and residuals management are presented. The hierarchy of waste disposal options including source reduction, composting, recycling, combusting, and landfilling techniques are discussed in detail. The mechanical, chemical and operational aspects of various disposal options are discussed. Case studies are presented to highlight the issues. Prerequisite(s): Jr. status or instructor's permission. Credits: 3 (3.0)

15.452 OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS

This course examines the proper operation and maintenance of wastewater collection systems. Inspection, testing, installation, and repairs of the collection system are covered. Health hazards encountered in this work are addressed and safety is emphasized. Pumping station operation and maintenance are discussed in detail. Confined space entry and working hazardous environments are also addressed. Credits: 3 (3.0)

15.470 CONSTRUCTION PROJECT MANAGEMENT

Development of management skills and techniques to plan, schedule, supervise, and control construction projects. Project estimating; labor costs and productivity; construction plans, specifications and contracts; labor relations; time, cost and quality control; construction equipment and project decision making and financing. Prerequisite(s): Senior status. Credits: 3 (3.0)

15.486 TRANSPORTATION ELEMENTS

Transportation Elements is the study of a variety of issues associated with the planning, project evaluation, vehicle/driver/traffic characteristics, roadway capacity and social/economic/environmental impacts of transportation projects. Students will develop and retain a basic understanding of the environmental process and alternatives analysis as well as design considerations. Practical, real-world examples will be used to model the topics of each lecture. The concepts presented in this course directly relate to numerous other civil engineering fields. Prerequisite(s): 15.257. Credits: 3 (3.0)

15.492 WATER/WASTEWATER PLANT MANAGEMENT

This course presents an introduction to the principles of management with emphasis on topics related to the operation of water and wastewater treatment plants. The following subjects are discussed: staffing, labor relations, public relations, financing, budgeting, legislation and management principles. Credits: 3 (3.0)

16.201 CIRCUIT THEORY I

Terminal characteristics of ideal elements, active and passive. Ohm's law and Kirchoff's laws. Introduction to network topology, independent variable, loop and nodal analysis with matrix methods. Definition and consequences of linearity. Superposition theorem. Concept of excitation and response. Passive equivalent circuits. Thevenin's and Norton's theorems. Ideal inductance and capacitance, volt-ampere characteristics, energy relations, graphical differentiation and integration. First order transients; initial conditions, natural response, and natural frequencies. Network response to unit step function and unit impulse. Second order transients: RLC circuits, natural frequencies and the complex-frequency s-plane. Prerequisite(s): 92.132. Corequisite: 16.207. Credits: 3 (3.0)

16.202 CIRCUIT THEORY II

Discusses the sinusoidal forcing function, complex numbers, phasors, sinusoidal steady-state conditions, impedance, average real power, reactive power and rms values, exponential forcing function, poles and zeros in the s-plane, concept of the system function and its use in determining the forced response and resonance, reactance cancellation and concept of s-plane vectors. The course also covers Thevenin's and Norton's theorems, superposition, reciprocity, and maximum power in the frequency domain, impedance and admittance. Introduction to matrices and their use in circuit analysis, magnetic coupling, mutual inductance, and ideal transformer. Engineering Science (100%). Prerequisite(s): 16.201. Credits: 3 (3.0)

16.207 BASIC ELECTRICAL ENGINEERING LABORATORY I

Experimental work designed to verify theory and to acquaint students with electrical measurement techniques: experiments on meters, bridges, and oscilloscopes. Experiments are correlated with course 16.201 and concern: resistive measurements, Kirchhoff's laws, network theorems, conservation of power and maximum power transfer, inductance and capacitance, and first and second-order transients, operational amplifiers. Prerequisite(s): P: 92.132; C: 16.201. Credits: 2 (0.0)

16.208 BASIC ELECTRICAL ENGINEERING LAB II

Presents experimental work designed to emphasize electrical measurement techniques of linear systems with time-varying signals. Waveform measurements with dc and ac meters as well as advanced use of the oscilloscope are also discussed. Experiments are integrated with course 16.202. Experiments cover: Kirchhoff's laws for phasors, bode plots, magnitude and phase measurements of impedance, network theorems, frequency response, resonance, inductance, maximum power transfer, and MATLAB techniques. Engineering Science (50%); Engineering Design (50%). Prerequisite(s): 16.207. Corequisite: 16.202. Credits: 2 (0.0)

16.208 BASIC ELECTRICAL ENGINEERING LAB II

Presents experimental work designed to emphasize electrical measurement techniques of linear systems with time-varying signals. Waveform measurements with dc and ac meters as well as advanced use of the oscilloscope are also discussed. Experiments are integrated with course 16.202. Experiments cover: Kirchhoff's laws for phasors, bode plots, magnitude and phase measurements of impedance, network theorems, frequency response, resonance, inductance, maximum power transfer, and MATLAB techniques. Engineering Science (50%); Engineering Design (50%). Prerequisite(s): 16.207. Corequisite: 16.202. Credits: 2 (3.0)

16.265 LOGIC DESIGN

Number systems and computer codes. Switching algebra. Canonical and fundamental forms of switching functions. Minimization of switching functions. Two-level and multi-level digital circuits. Decoder, encoders, multiplexers, and demultiplexers. Design of combinational circuits using SSI, MSI and programmable logic devices. Latches and flip-flops. Registers and counters. Analysis and synthesis of synchronous sequential circuits. Design of more complex circuits: datapath and control. Prerequisite(s): P: 25.108 or 91.101. Credits: 3 (3.0)

16.311 ELECTRONICS I LAB

Laboratory experiments coordinated with the subject matter of 16.365. Characteristics and use of electronic instrumentation for making measurements on electronic circuits. Methods of designing and characterizing diode and transistor circuits. Analysis of performance characteristics of digital and linear semiconductor circuits, including logic elements and amplifiers. Design and construction of circuits using monolithic op amps. Prerequisite(s): 16.202; C: 16.365. Credits: 2 (0.0)

16.311 ELECTRONICS I LAB

Laboratory experiments coordinated with the subject matter of 16.365. Characteristics and use of electronic instrumentation for making measurements on electronic circuits. Methods of designing and characterizing diode and transistor circuits. Analysis of performance characteristics of digital and linear semiconductor circuits, including logic elements and amplifiers. Design and construction of circuits using monolithic op amps. Prerequisite(s): 16.202; C: 16.365. Credits: 2 (4.0)

16.312 ELECTRONICS II LABORATORY

Laboratory experiments coordinated with the subject matter of 16.366. High-frequency characteristics of transistors and transistor amplifiers. Feedback in electronic circuits. Electronic oscillators. Differential amplifiers. Properties of linear IC operational amplifiers and their application in amplifier circuits and waveform generation circuits. Linear circuit design and analysis. Prerequisite(s): 16.311. Corequisite: 16.366. Credits: 2 (0.0)

16.312 ELECTRONICS II LABORATORY

Laboratory experiments coordinated with the subject matter of 16.366. High-frequency characteristics of transistors and transistor amplifiers. Feedback in electronic circuits. Electronic oscillators. Differential amplifiers. Properties of linear IC operational amplifiers and their application in amplifier circuits and waveform generation circuits. Linear circuit design and analysis. Prerequisite(s): 16.311. Corequisite: 16.366. Credits: 2 (3.0)

16.317 MICROPROCESSORS SYSTEMS DESIGN I

Introduction to microprocessors, Uses assembly language to develop a foundation on the hardware which executes a program. Memory and I/O interface design and programming. Design and operation of computer systems. Study of microprocessor and its basic support components, including detailed schematics, timing and functional analysis of their interactions. Laboratories directly related to microprocessor functions and its interfaces (e.g. memory subsystem, I/O devices and coprocessors). Prerequisite(s): 16.265. Credits: 3 (3.0)

16.360 ENGINEERING ELECTROMAGNETICS I

Waves and Phasors, Transmission lines as Distributed Circuits, Smith Chart Calculations, Impedance Matching, Transients on Transmission Lines, Vector Analysis,Electrostatics and Capacitance, Steady current flow in conductors and Resistance, Magnetostatics and Inductance. Prerequisite(s): 16.202, 92.234. Credits: 3 (3.0)

16.362 SIGNALS AND SYSTEMS I

A study of various continuous voltage/current time functions and their applications to linear time-invariant electrical systems. Review of pertinent topics from 16.202, such as system functions, S-plane concepts and complete responses. Step, ramp and impulse responses of linear circuits. Sifting integrals. Types of analog filter responses. Designs for Butterworth and Chebishev filters. Fourier Analysis, Fourier Transforms, Convolution, Laplace Transforms, Parseval's Theorem. A large portion (30-40%) is devoted to teaching the

students communication skills and the use of MATLAB for solving homework problems. A MATLAB based text is assigned to the course. Prerequisite(s): 92.236 and 16.202. Credits: 3 (3.0)

16.363 SIGNALS & SYSTEMS II

This course employing probabilistic methods of signal and system analysis (an extension of 16.362) considers the random nature of the world faced by electrical engineers. The course addresses the issues of the nature and characterization of random events, especially noise and its effect on systems. The course is divided into three parts, 1) Introduction to discrete and continuous probability 2) Introduction to statistical methods and 3) random signals and noise and the response of linear systems to random signals. There will be frequent use of Monte-Carlo simulation techniques on the computer to allow students toverify theory and to learn the important technique of simulation. Applications of theory to manufacturing and reliability, noise analysis, spectral analysis, data communication, data collection, and system design will be presented. Prerequisite: 16.362 Prerequisite(s): 16.362. Credits: 3 (3.0)

16.364 ENGINEERING MATHEMATICS

Complex number, Argand plane, derivatives of complex numbers, limits and continuity, derivative and Cauchy Riemann conditions, analytic functions, integration in the complex plane, Cauchy's integral formula, infinite series for complex variables. Taylor series, Laurent series, residue theory, evaluation of integrals around indented contours. Linear vector spaces, matrices and determinants, eigenvalues and eigenvectors. Prerequisite(s): 92.234 and 16.201. Credits: 3 (3.0)

16.365 ELECTRONICS I

A brief introduction to solid-state physics, leading to discussion of physical characteristics of p-n junction diodes, bipolar junction transistors, and field-effect transistors: active, saturated, and cutoff models of bipolar transistors and triode, constant current, and cutoff models of MOSFETs. Circuit models for diodes, and diode applications. Circuit models for transistors, and transistor applications in bipolar and MOS digital circuits and low-frequency amplifier circuits. Analysis of digital circuits and linear circuits based on application of circuit models of devices and circuit theory. Prerequisite(s): 84.122 and 16.202. Credits: 3 (3.0)

16.366 ELECTRONICS II

A continuation of 16.365 with discussion of differential amplifiers, operation amplifiers and op amp applications, transistor amplifiers at very high frequencies; direct-coupled and band pass amplifiers; small and large signal amplifiers; feedback amplifiers and oscillators. Active filters, wave form generation circuits including Schmitt trigger, multiplexers, and A/D and D/A converters. Circuit design employing integrated circuit operational amplifiers and discrete devices. Circuit analysis using SPICE. An electronic design project constitutes a major part of the course. Prerequisite(s): Corequisite: 16.312. Credits: 3 (3.0)

16.409 DIRECTED STUDIES

Provides an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study, that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project. Engineering Design (100%). Prerequisite(s): At least three courses from 16.355, .360, .362,.365, and .366. Credits: 3 (4.0)

16.412 DIRECTED STUDIES

The purpose of this course is to provide an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study and that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project. Credits: 3 (0.0)

16.413 LINEAR FEEDBACK SYSTEM

Concepts of feedback; open loop and closed loop systems. Feedback in electrical and mechanical systems. Mathematical models of systems and linear approximations. Transfer functions of linear systems, block diagrams and signal flow graphs. Sensitivity, control of transient response, disturbance signals. Time domain performance: steady state errors, performance indices. Stability related to s-plane location of the roots of the characteristic equation. Routh-Hurwitz criterion. Graphical analysis techniques: root locus, frequency response as polar plot and Bode diagrams. Closed loop frequency response. A control system design project is included in the course. Credits: 3 (3.0)

16.421 REAL TIME DIGITAL SIGNAL PROCESSING

This course provides an introduction to real-time digital signal processing techniques using the TMS320C3x floating point and TMS320C5x fixed point processors. The architecture, instruction set and software development tools for these processors will be studied via a series of C and assembly language computer projects where real-time adaptive filters, modems, digital control systems and speech recognition systems are implemented. Prerequisite(s): 16.362. Credits: 3 (3.0)

16.428 ALTERNATIVE ENERGY SOURCES

PV conversion, cell efficiency, cell response, systems and applications. Wind Energy conversion systems: Wind and its characteristics; aerodynamic theory of windmills; wind turbines and generators; wind farms; siting of windmills. Other alternative energy sources: Tidal energy, wave energy, ocean thermal energy conversion, geothermal energy, solar thermal power, satellite power, biofuels. Energy storage: Batteries, fuel cells, hydro pump storage, flywheels, compressed air. Prerequisite(s): Permission of instructor. Credits: 3 (3.0)

16.429 ELECTRIC VEHICLE TECHNOLOGY

Electric vehicle VS internal combustion engine vehicle. Electric vehicle (EV) saves the environment. EV design, EV motors, EV batteries, EV battery chargers and charging algorithms, EV instrumentation and EV wiring diagram. Hybrid electric vehicles. Fuel cells. Fuel cell electric vehicles. The course includes independent work. Prerequisite(s): Permission of instructor. Credits: 3 (3.0)

16.460 BIOMEDICAL INSTRUMENTATION

Analysis and design of Biomedical Instrumentation systems that acquire and process biophysical signals. Properties of Biopotential signals and electrodes; Biopotential Amplifiers and Signal Processing; Basic Sensors and Principles; Medical Imaging Systems; Electrical Safety. Credits: 3 (3.0)

16.461 ENGINEERING ELECTROMAGNETICS II

Continuation of Magnetostatics, Maxwell's Equations for Time-varying Fields, plane waves: time-harmonic fields, polarization, current flow in good conductors and skin effect, power density and Poynting vector, wave reflection and transmission; Snell's Law, fiber optics, Brewster angle, radiation and simple antennas, electromagnetic concepts involved in a topical technology in development. Prerequisite(s): 16.360, 16.364. Credits: 3 (3.0)

16.470 VLSI FABRICATION

Fabrication of resistors, capacitors, p-n junction and Schottky barrier diodes, BJT's and MOS devices and integrated circuits. Topics include: silicon structure, wafer preparation, sequential techniques in microelectronic processing, testing and packaging, yield and clean room environments. MOS structures, crystal defects, Fick's laws of diffusion; oxidation of silicon, photolithography including photoresist, development and stripping. Metallization for conductors, Ion implantation for depletion mode and CMOS transistors for better yield speed, low power dissipation and reliability. Students will fabricate circuits using the DSIPL Laboratory. Prerequisite(s): 17.365; instructor permission. Credits: 3 (3.0)

16.491 INDUSTRIAL EXPERIENCE

This 3 credit course is for co-op or industrial experience. It may be taken three times and the co-op internship should be for at least 500 hours in order to be eligible for credit. Only 3 credits may be used toward the BSEng in CpE or EE degree. Registration for this course is conditional on the approval of the department co-op coordinator. A grade of Satisfactory or Unsatisfactory is given. Prerequisite(s): Permission of coordinator. Credits: 3 (3.0)

16.492 INDUSTRIAL EXPERIENCE II

Industrial work experience by permission of coordinator only. Prerequisite(s): Permission of coordinator. Credits: 3 (3.0)

16.493 INDUSTRIAL EXPERIENCE III

This three credit course is for co-op or industrial experience. It may be taken three times and the co-op internship should be for at least 500 hours in order to be eligible for credit. Only 3 credits may be used toward the BSEng in CpE or EE degree. Registration for this course is conditional on the approval of the Department Co-op coordinator. A grade of Satisfactory or Unsatisfactory is given. Prerequisite: Permission of Instructor Prerequisite(s): Permission of coordinator. Credits: 3 (3.0)

16.499 CAPSTONE PROJECT

The purpose of the Capstone Project is to provide the student with a design experience which resembles entry level engineering assignments. It is expected that the project encompass a minimum of three technical areas within the CpE or EE discipline, and include some aspects of each step in the development of a marketable product i.e. Research, Design & Development, Manufacture, Marketing & Service. A formal technical report must be submitted prior to the submission of a course grade. Prerequisite 16.399 and 16.400 Prerequisite(s): 16.399, 16.400. Credits: 3 (0.0)

16.499 CAPSTONE PROJECT

The purpose of the Capstone Project is to provide the student with a design experience which resembles entry level engineering assignments. It is expected that the project encompass a minimum of three technical areas within the CpE or EE discipline, and include some aspects of each step in the development of a marketable product i.e. Research, Design & Development, Manufacture, Marketing & Service. A formal technical report must be submitted prior to the submission of a course grade. Prerequisite 16.399 and 16.400 Prerequisite(s): 16.399, 16.400. Credits: 3 (3.0)

17.130 ELECTRICAL BASICS AND LABORATORY

This course introduces the basic principles of electrical engineering, including the concepts of voltage, current, resistance, inductance and capacitance. Ohm's Law, Kirchhoff's Laws, superposition, Thevenin's theorem, and Norton's theorem will be covered. Alternating current concepts, frequency response and filters are discussed. The use of laboratory power supplies and measuring instruments such as oscilloscopes, voltmeters, ammeters and ohmmeters are demonstrated. Written reports are required. Prerequisite(s): 92.125, Not available for EET majors. Credits: 2 (3.0)

17.131 ELECTRONIC BASICS AND LABORATORY

The Electronic Basics and Laboratory serves as a continuation and elaboration of 17.130. The course covers diodes, transistors and electronic amplifiers, power supplies, Magnetics and electromechanics. Further use of laboratory equipment, function generators, power supplies, DMM and oscilloscope will be demonstrated. Prerequisite(s): 17.130, Not available for EET majors. Credits: 2 (3.0)

17.132 DIGITAL BASICS AND LABORATORY

This course presents an introduction to number systems and digital logic, including both combinational and sequential digital logic networks. Other topics include: binary, decimal, octal, and hexadecimal number systems; base conversion; Boolean algebra; Karnaugh maps; and sequential counters. Computer terminals are available in the laboratory and their use is expected. Written reports are required. Prerequisite(s): 17.130, Not available for EET majors. Credits: 2 (3.0)

17.200 BASIC GEOMETRICAL OPTICS

Geometrical imaging with optical elements, flux throughput, throughput relations, image quality considerations, applications of design concepts. Prerequisite(s): Algebra and trigonometry background. Credits: 3 (3.0)

17.201 INTRODUCTION TO FIBER OPTICS

Advantages and disadvantages of fibers, fundamental properties and applications; types of fibers, optical properties of fibers; making fibers and special-purpose fibers, fiber lasers and amplifiers; cables, splices, connectors; light sources and transmitters, WDM and DWDM; receivers; repeaters, regenerators and optical amplifiers; passive and active optical components; fiber system measurements; fiber networks and standards; network design and power budgets; telecommunication networks; future trends. Prerequisite(s): Algebra and trigonometry background. Credits: 3 (3.0)

17.202 INTRODUCTION TO OPTICAL SYSTEMS

Introduction to basic optics and laser safety, Optical sources: black bodies, laser sources, brightness, bandwidth, LEDs, LDs, detectors, guiding, modulating and manipulating light. Prerequisite(s): Algebra and trigonometry background. Credits: 3 (3.0)

17.213 ELECTRIC CIRCUITS I

This course discusses: electrical circuits; voltage, current and resistance; energy, power and charge; Ohm's Law, Kirchhoff's Current Law and Kirchhoff's Voltage Law; simplification and conversion techniques for networks containing sources and/or resistance; Thevenin's and Norton's theorems; fundamentals of magnetism and magnetic circuits; properties of capacitance and inductance and associated transient behavior of circuits. Prerequisite(s): 92.125 (May be taken concurrently), 90.267. Credits: 3 (3.0)

17.214 CIRCUITS II AND LABORATORY

This course provides a continuation of 17.213. Topics include sinusoidal waveforms, phasors, impedance and network elements. Mesh and nodal analysis of AC circuits; series and parallel circuits, superposition and Wye/Delta conversions are also covered. The use of power supplies and various electrical measuring instruments will be studied. DC circuit analysis concepts studied in 17.213 will be verified by laboratory experiments. Written reports are required. Alternate lecture and laboratory sessions. Prerequisite(s): 17.213. Credits: 2 (3.0)

17.215 CIRCUITS III AND LABORATORY

This course serves as a continuation of 17.214. Topics to be discussed include maximum power transfer, real and reactive power; resonance; and polyphase systems. Oscilloscopes, voltage, current and phase measurements are demonstrated. Other topics include series and parallel sinusoidal circuits, series-parallel sinusoidal circuits, series resonance, parallel resonance and transformers. Filters, 2-port networks, computer aided circuit analysis (PSPICE). Computer terminals will be available in the laboratory and their use is expected. Written reports are required. Alternate lecture and laboratory sessions. Prerequisite(s): 17.214. Credits: 2 (3.0)

17.216 CIRCUITS IV AND LABORATORY

Advanced Circuits is a continuation of passive circuit analysis, where the student is introduced into the frequency domain. LaPlace techniques are used to analyze electric circuits using sources and elements similar to those in earlier circuit analysis courses. The concept of boundary conditions is introduced along with initial value and final value theorems. There is a brief review of mathematical concepts such as logarithm, exponential functions and partial fraction expansion to aid the student for newer analysis techniques. The S plane is introduced as a graphical technique to plot the poles and zeros of a function and acquire an insight into the time domain. The dualities of electrical elements in other engineering fields (mechanical, fluids and thermal) are introduced and analyzed using LaPlace techniques. Bode plots are used as another tool to gain insight into the time domain. The cascade interconnect is introduced along with the concept of transfer functions and the impulse response. Filter circuits are again analyzed but this time in the frequency domain using the concepts of LaPlace and Bode. Prerequisite(s): 17.215. Credits: 3 (3.0)

17.341 LOGIC DESIGN I AND LABORATORY

This course studies numbers, switching (Boolean) algebra, switching functions, and combinational circuits, number systems and conversion, binary codes, switching algebra, algebraic simplification of switching functions, canonical forms of switching functions, switching function minimization using Karnaugh maps, two-level and multi-level combinational circuits, gate conversion, decoders, encoders, multiplexers, and demultiplexers, programmable logic devices: read-only memories, programmable logic arrays and programmable array logic. Prerequisite(s): 17.214. Credits: 3 (3.0)

17.342 LOGIC DESIGN II AND LABORATORY

This course studies the design of combinational circuits using programmable logic devices: read-only memories, programmable logic arrays, and programmable array logic, latches and flip-flops, registers, counters. Moore model and Mealy model synchronous sequential circuits, analysis and design of synchronous sequential circuits, state reduction, one-hot state assignment, two's complement arithmetic, register transfer logic, algorithmic state machine (ASM) chart, data-path and control circuit, design of a simple arithmetic processor. Prerequisite(s): 17.341. Credits: 3 (3.0)

17.346 LOGIC DESIGN A

Studies the number systems, switching algebra and combinational logic. Topics include: number systems and binary codes; switching algebra and algebraic simplification; minimization of switching functions using Karnaugh maps, variable-entered maps, and tabular method; multilevel networks; multiple-output networks; network conversion and mixed logic; designs using decoders, multiplexers, read-only memories, programmable logic arrays, and programmable array logics. Prerequisite(s): 17.355. Credits: 3 (3.0)

17.347 LOGIC DESIGN B

Serves to extend the principles of 17.346 to sequential networks. Topics include: synchronous sequential networks; state diagrams and tables; transition tables; state assignment; merger graphs and tables; implica-

tion graphs; fundamental mode asynchronous sequential networks; and flow tables, cycles, races, and critical race-free assignments. Prerequisite(s): 17.346. Credits: 3 (3.0)

17.348 LOGIC DESIGN C AND LABORATORY

Provides a laboratory-oriented practicum of the professional design and construction of digital circuits with TTL integrated circuits on a portable logic design kit. There are seven experiments in one semester. Written reports are required along with wired circuits. Laboratory experiments include: (1) realization of switching functions using decoders and multiplexers; (2) hamming code decoder design; (3) designs of multiple-output circuits; (4) master-slave JK flip-flops, synchronous sequential circuits using (5) flip-flops and (6) binary counters and (7) arithmetic processors. Experiments are normally designed and wired at home and brought to the laboratory for inspection and testing. Prerequisite(s): 17.347, 17.353. Credits: 2 (3.0)

17.350 CONTROL SYSTEMS I

This course covers the concepts of feedback; open loop and closed loop systems, feedback in electrical and mechanical systems, mathematical models of systems and linear approximations, transfer functions of linear systems, block diagrams and signal flow graphs, sensitivity, control of transient response, disturbance signals, time domain performance: steady state errors, performance indices, stability related to s-plane location of the roots of the characteristic equation, Routh-Hurwitz criterion, graphical analysis techniques: root locus, frequency response as polar plot and Bode diagrams, closed loop frequency response. A control system design project is included in the course. Prerequisite(s): 17.216. Credits: 3 (3.0)

17.353 DIGITAL ELECTRONICS

This course presents the building blocks and concepts associated with digital electronic networks. The material presented will cover the design requirements necessary to develop successfully functioning digital logic circuits. The lectures will cover combinatorial networks, the Eber-Moll Transistor model, state devices, RTL, TTL, ECL, and CMOS logic families, read-only memories (ROMs), static and dynamic MOS random access memories (RAMs), programmable logic arrays (PLAs) and macrocell logic. Homework, based on actual applications, is designed to provide practice in the use of the fundamental circuit design. Real life examples are given to show the application of design theory. Prerequisite(s): 17.356, 17.341. Credits: 3 (3.0)

17.354 PSPICE SIMULATION

OrCAD's Capture is used as the schematic entry tool to generate circuits that will be simulated using PSPICE. AC and DC independent and dependent sources and device models will be used in these circuits that will then be evaluated by various simulation methods using voltage, current and frequency sweeping as well as temperature and time sweeps. The graphical analysis tool, Probe, will be used to display the results of the simulations and Probe's mathematical functions will be used to further analyze the simulation results. All of these functions will be presented in a combination of lecture, homework and "Hands On" PC Lab environment. Applications learned in class will be re-enforced by homework problems, which will then be applied in the PC Lab. Prerequisite(s): 17.355. Credits: 3 (3.0)

17.355 ELECTRONICS I AND LABORATORY

This course introduces Electronics from a fundamental perspective and analyses of circuits from a practical point of view. Semiconductor devices and their application are stressed. This course surveys the operating characteristics of pn junction diodes, transistors, and operational amplifiers, and analyzes their application in actual circuits. The use of diodes in power switching circuits and the use of transistors in logic circuits and amplifiers will be covered extensively. Examples and homework, based on present day applications, are designed to provide practice in the use of fundamental concepts, and applications. It is expected that following the four course electronic sequence, students will be able to use the textbook used in this course or other professional level electronic texts for further study of specific electronic topics. The course includes computer applications in solving problems involving models of electronic devices and circuits. Coverage of some topics is based on notes handed out that augments coverage in Sedra and Smith. Prerequisite(s): 17.215, 42.226. Credits: 2 (3.0)

17.356 ELECTRONICS II AND LABORATORY

This is the second course in a series of four courses with Labs. It introduces Electronics from a fundamental perspective and analyzes circuits from a practical point of view. Semiconductor devices and their application are stressed. P-and N-channel MOSFETs and junction field effect transistors (FET) will be introduced and discussed. These include linear small-signal AC models, and amplifier. This course surveys the operating characteristics of MOSFET and bipolar junction transistors (BJT) its circuit symbols; nonlinear large signal behavior and operational amplifiers, and analyses; their application in actual circuits. Large signal piecewise linear DC circuits, and small signal AC circuits will be studied. This course will include MOSFET and BJT as used in amplifiers, switches cut-off and saturation will be discussed. Examples and homework, based on present day applications, are designed to provide practice in the use of fundamental concepts, and applications. It is expected that following the four course electronic sequence, students will be able to use the textbook used in this course or other professional level electronic texts for further study of specific electronic topics. The course includes computer applications in solving problems involving models of electronic devices and circuits. Coverage of some topics is based on notes handed out that augments coverage in Sedra and Smith. Prerequisite(s): 17.215, 17.355, 42.226, 92.126. Credits: 2 (3.0)

17.357 ELECTRONICS III AND LABORATORY

This course introduces Electronics from a fundamental perspective and analyses of circuits from a practical point of view. It is expected that following the four course electronic sequence, students will be able to use the textbook used in this course or other professional level electronic texts for further study of specific electronic topics. The following topics will be covered: review BJT and MOSFET, differential amplifiers, and frequency response of different types of amplifiers will

be discussed, diff. pair, small signal analysis, biasing, current source, active load CMOS, Frequency response, Bode Plots cascode configuration. Prerequisite(s): 17.356. Credits: 2 (3.0)

17.358 ELECTRONICS IV AND LABORATORY

This course provides the student with the understanding of feedback. The course covers the feedback equations, the four topologies of feedback, two port theory, Bode Plots, active filters, Weinbridge Oscillators, and power amplifiers. There are two experiments the first covers finite gain, finite band width, output resistance, input resistance, and nonlinear distortion. The second covers multiple poles and loop stability, stabilization with three coincident poles, and loop gain for oscillation. Prerequisite(s): 17.357. Credits: 2 (3.0)

17.360 MATHEMATICS AND STATISTICS/E.E.T.

This course covers the basic introduction to probability and statistics as applied to technological problems. After introducing the fundamentals of discrete and continuous random variables the concepts are extended to multivariable situations. Moment generating functions, characteristic functions, and transformations of random variables are discussed. Introduces the statistical inference concepts of estimation and hypothesis testing and applies them to various problems in signal processing, communication, and manufacturing quality assurance. Prerequisite(s): 17.353, 17.358, 17.365. Credits: 3 (3.0)

17.361 PROJECT LABORATORY A

The project lab runs for 14 weeks with design, fabrication, and testing of the project during weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. Prerequisite(s): 17.353, 17.358, and 17.365 may be substituted with 17.354. Credits: 2 (3.0)

17.365 APPLIED LINEAR DEVICES

This course discusses the linear and nonlinear applications and characteristics of linear-integrated devices. Optimal use of industry-published specifications, application notes and handbook data will be stressed. Topics to be covered include operational amplifiers, regulators, comparators, analog switches, time-function generators, instrument circuits, logarithmic circuits, computing circuits, and signal processing circuits. Prerequisite(s): 17.350 and 17.357. Credits: 3 (3.0)

17.368 DATA CONVERSION AND LABORATORY

This course teaches the fundamentals of data conversion including digital to analog converters (DACs) using R/2R ladder networks, analog to digital converters (ADCs), sampling theory, coding schemes, sources of errors in DAC's and ADC's, voltage to frequency converters, frequency to voltage converters, sample and hold circuits, transfer functions of converters, wave shaping devices, and applications by designing and constructing a data conversion system. Prerequisite(s): 17.341. Credits: 2 (3.0)

17.376 ELECTROMAGNETIC THEORY I

This course examines waves and phasors, transmission lines as distributed circuits, Smith chart calculations, impedance matching, transients on transmission lines, vector analysis, electrostatics and capacitance, steady current flow in conductors and resistance, magnetostatics and inductance. Prerequisite(s): 17.213, 17.214, 92.236. Credits: 3 (3.0)

17.383 MICROPROCESSORS A

Introduces the microprocessor and microprocessor programming through an integrated set of experiments and related lectures. Topics include: binary, decimal, and hexadecimal numbers; the microprocessor; memory devices; structure of microprocessor-based systems; programming and instruction sets; addressing modes; arithmetic, logical, and shift instructions; branch conditions and instructions; indexed addressing; the tack; subroutines; assembly language; floating-point routines; and software development techniques. Approximately one-half of the course time will be an associated laboratory, culminating with a programming project. Prerequisite(s): 17.341. Credits: 3 (3.0)

17.384 MICROPROCESSORS B

Extends the skills developed in 17.393 to interfacing the microprocessor to the outside world through an integrated set of experiments and related lectures. Topics include: architecture of microprocessor-based systems; microcontrollers; parallel I/O ports; interrupts; A/D and D/A converters; programmable timers; handshaking; and serial communications. The course will contain a three-week project applying the functions learned to a real world design. Approximately one-half of the course time will be an associated laboratory. Prerequisite(s): 17.383. Credits: 2 (3.0)

17.391 PROJECT LABORATORY B

The project lab runs for 14 weeks with design, fabrication, and testing of the project during weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. May do project at work (all requirements of reports, presentation, etc. still required). Prerequisite(s): 17.361, or 17.353 and 17.358 and 17.365, and at least one 17.4-- E.E.T. elective. Credits: 2 (3.0)

17.392 PROJECT LABORATORY C

The project lab runs for 14 weeks with design, fabrication, and testing of the project during weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. May do project at work (all requirements of reports, presentation, etc. still required). Prerequisite(s): 17.361, or 17.353 and 17.358 and 17.365, and at least one 17.4-- E.E.T. elective. Credits: 3 (3.0)

17.427 DIGITAL SIGNAL PROCESSING

This course covers the basic theory of digital signal processing. Sampling theory, discrete time signals and systems, and transform methods – Z transform and Fourier series and transforms – are discussed in detail. Computational techniques, such as the Fast Fourier Transform are discussed. The basic concepts of digital filter design are described. Prerequisite(s): 17.353, 92.234, 90.267. Credits: 3 (3.0)

17.459 POWER CONVERSION DESIGN I

Power supply design is introduced starting with a simple half wave and full wave rectifier capacitor filtered power supplies. The student will develop a design process that details performance requirements that will translate into topology selection and component requirements. To improve line and load regulation as well a output voltage precision, feedback control is introduced using the linear regulator. Circuit elements that effect regulation will be explored and the improvements in regulation through closed loop gain are demonstrated. Protection circuits, regulator efficiency and thermal design are also introduced. The high frequency switching forward converter topologies are explored, detailing the output filter design and it's effect on control and loop stability. Bode plots are used to determine loop stability and selection of the amplifier's break frequencies. PSPICE is used as a tool to plot over all regulator frequency response. The output filter inductor design is studied with respect to core selection, wire size and thermal analysis. The switching regulator efficiency is also studied. Along with the forward converter, the flyback regulators are also introduced both in continuous and discontinuous mode of operation. Prerequisite(s): 17.350 and 17.365. Credits: 3 (3.0)

17.469 CONTROL SYSTEMS II

Serves as a complement to 17.350 in that modern approaches to control system design are described. State space modeling techniques are presented. State feedback using pole placement is introduced. State estimation using observers is presented in the context of closed loop state feedback design. Techniques for digital control are discussed along with concepts from optimal and nonlinear control. Prerequisite(s): 17.350. Credits: 3 (3.0)

17.477 ELECTROMAGNETIC THEORY II

Review of Maxwell's equations. The wave equation for free space propagation. Concept of a time varying electromagnetic field. Sinusoidal plane waves. Plane waves in dielectric and conductive media. Poynting's vector, depth and penetration, force and radiation pressure, reflection of EM waves from perfect conductors, dielectrics, and multiple dielectrics. Quarter wave and half-wave matching, polarization, Brewster's angle, and surface waves. Introductory concepts in guided electromagnetic waves including transmission lines, waveguides, and antennas from the viewpoint of Maxwell's equations. Prerequisite(s): 17.376 and 92.234. Credits: 3 (3.0)

17.479 ELECTRO -OPTICS

Optical radiation, lasers, light modulators, detectors, fiber optic elements and systems. Prerequisite(s): 17.300 or permission of instructor. Credits: 3 (3.0)

17.485 FUNDAMENTALS OF COMMUNICATION SYSTEMS

The course will provide an overview of various techniques and technologies used in communication systems. Signal analysis and linear system analysis will be discussed along with various nonlinear techniques. Various modulation techniques to be discussed will include linear modulation (AM), angle modulation (FM), and several types of digital modulation. Issues related to wireless systems as well as computer communication will be addressed. Prerequisite(s): 17.376, 92.132 Credits: 3 (3.0)

17.486 DIGITAL COMMUNICATIONS AND NETWORKS

The course will focus on both digital communication techniques used in wireless transmission and on communication networking for data transmission. Equal emphasis will be given to both areas. This course is independent of the Fall course, Fundamentals of Communication Systems, which is not a prerequisite. The digital techniques portion covers the basics of information capacity of transmission channels as well as various source coding and digital modulation techniques. The networking lectures will include discussion of various system architectures and the protocols used to insure reliable communications. Credits: 3 (3.0)

22.211 STATICS

The application of Newton's Laws to engineering problems in statics. The free-body diagram method is emphasized. Topics include vector algebra, force, moment of force, couples, static equilibrium of rigid bodies, trusses, friction, properties of areas, shear and moment diagrams, flexible cables, screws, bearings, and belts. Credits: 3 (3.0)

22.212 STRENGTH OF MATERIALS

Stress and deformation analysis of bodies subjected to uniaxial loading, thermal strain, torsion of circular cross-sections, shear flow in thin-walled sections, bending of beams, and combined loading. Application of equilibrium, compatibility and load-deformation relations to solve statically determinate and indeterminate systems. Prerequisite(s): 22.211. Credits: 3 (3.0)

22.213 DYNAMICS (ALTERNATE 14.205)

Calculus based vector development of the dynamics of points, particles, systems of particles, and rigid bodies in planar motion; kinematics of points in rotating and non-rotating frames of reference in one, two, and three dimensions; conservation of momentum, and angular momentum; principle of work and energy. Prerequisite(s): 22.211, 92.231. Credits: 3 (0.0)

22.242 THERMODYNAMICS

The first and second laws of thermodynamics are introduced and applied to the analysis of thermodynamic systems in terms of work, heat, energy transformation, and system efficiency. The use of tables, graphs, and equations of state is introduced to obtain various properties of pure substances. The concepts of work, heat and energy, as well as their relationships, are studied. The theory and application of reversible and irreversible thermodynamic process, Carnot cycles, and entropy are studied in relation to the energy analysis of engineering systems. Energy balances and ideal efficiencies of steady flow engineering systems are analyzed. Prerequisite(s): 92.132 and 95.245, 84.117 or 84.121. Credits: 3 (3.0)

22.381 FLUID MECHANICS

Development of basic fluid mechanical relations: fluid behavior and properties; hydrostatic pressure and force, buoyancy and stability; continuity, momentum and Bernoulli equations; similitude, dimensional analysis and modeling. Emphasis is placed on the control volume approach for solving problems. Students engage in a design project in this course. Prerequisite(s): 22.212, 22.242. Credits: 3 (3.0)

22.403 MECHANICAL ENGINEERING LAB II: MEASUREMENT ENGINEERING

Continuation of Mechanical Engineering Lab I. Focuses on digital data acquisition systems used on mechanical engineering equipment. Students design measurement systems composed of various transducers, their associated signal conditioners and digital data acquisition and recording devices. Statistical methods are emphasized. Experiments require the students to provide calibration and to select appropriate sampling rates and test durations. Systems under test range from simple multisensor laboratory apparatus to actual operating mechanical systems. Prerequisite(s): 22.302, 22.311, 22.341, and 22.381. Credits: 3 (4.0)

23.101 ENGINEERING GRAPHICS

This course presents material in both class and laboratory format. Topics covered include: geometric constructions; multi-view sketching and projection; sectional views; isometric and oblique drawing; and dimensioning. Credits: 3 (3.0)

23.102 ENGINEERING DESIGN AND GRAPHICS

This course presents material in both class and laboratory format. Topics covered include: dimensioning, print reading, auxiliary views, graphs, screw threads, gears, and the design process. Working in teams, a major design project with written and oral reports is required. Prerequisite(s): 23.101. Credits: 3 (3.0)

23.200 COMPUTER AIDED DRAFTING

This course introduces the student to the use of CAD for construction of basic shapes and multi view drawings. It is a project oriented course introducing the student to graphic design using AutoCAD. AutoCAD, as it is applied in 23.200, is a two dimensional CAD program used to produce computer design models. Course stresses hands-on work with AutoCAD. Course is a fundamentals approach and requires no experience with other CAD programs. Prerequisite(s): 23.101. Credits: 3 (3.0)

23.202 THERMO/FLUIDS LABORATORY

The course covers the theory and the practical relevance of selected principles of thermo-fluids and fluid mechanics. Fundamentals of measurement and interpretation in the areas of thermo-fluids and fluid mechanics will be studied. The student will be responsible to collect data with the supplied test apparatus, interpret the physical significance of the data, in relation to the laws and principles of thermo/fluids, and to report findings. Strong emphasis is placed upon developing technical report writing skills. Prerequisite(s): 23.241, 23.242, 42.226. Credits: 2 (3.0)

23.211 LABVIEW™ PROGRAMMING WITH ENGINEERING APPLICATIONS

LabVIEW™ software is a graphical programming language "G" that is widely used in industrial setting by engineers and scientists alike. Materials covered in the course will be basic to programming structures. As an example, the course will cover For Loops, While Loops, Case Structures, and Boolean Logic. Control, data acquisition, data reduction, and analysis tools associated with the software program will be covered, and used. A comprehensive semester project will be assigned to teams of students to solidify the basic programming topics covered, teach the Virtual Instrument "VI" hierarchy, and to emphasize the importance of teamwork. Credits: 3 (3.0)

23.221 STATICS

Statics is the study of objects in equilibrium and the forces acting on that object. Students will develop mathematical models to predict and analyze forces and their distributions with the use of the free body diagram. The concepts presented in this course directly relate to other mechanical and civil engineering fields. Students must have a basic understanding of trigonometry, geometry, physics and calculus. This course is in a combined section with CET. Prerequisite(s): 92.125, 99.131. Credits: 3 (3.0)

23.222 DYNAMICS

This course introduces the student to the kinematics and kinetics of particles, systems of particles, and rigid bodies. This course covers the basic methods of analysis including Newton's 2nd Law (force, mass, acceleration), Work and Energy, and Impulse and Momentum. This course is in a combined section with CET. Prerequisite(s): 92.125, 92.126, 23.221/15.237. Credits: 3 (3.0)

23.223 MECHANICS OF MATERIALS

This course discusses the principles of strength of materials and the relationships between externally applied forces and internally induced stresses in various types of structural and machine members and components. Included are axial, torsional, and flexural loadings, stress-strain relationships, deformation of materials, elastic deformation, principal stresses, temperature effects, Mohr's circle, shear and bending moment diagrams, the design of beams, and the deflection of beams. Prerequisite(s): 23.221/ 15.237. Credits: 3 (3.0)

23.241 ELEMENTS OF THERMODYNAMICS I

This course presents a thorough treatment of the concepts and laws of thermodynamics. The first law (energy) and the second law (entropy), properties of liquids and gases, and common power cycles (Rankine and Otto) are covered. Included is an overview of the global energy problem and power generation technologies, both established and novel. Prerequisite(s): 92.126, 99.132. Credits: 3 (3.0)

23.242 APPLIED FLUID MECHANICS

This course addresses the Properties of Fluids and basic concepts of Continuity, Momentum, Hydrostatics, and Fluid Flow Kinematics. Analysis of flow of real fluids in pipes, ducts and open channels is conducted. The study of compressible flows, fluid cou-

plings as well as flow measurement techniques will also be discussed. Prerequisite(s): 23.222. Credits: 3 (3.0)

23.243 ELEMENTS OF THERMODYNAMICS II

This course is a continuation of Thermodynamics I analyzing in more detail various real world, practical power generation cycles, such as Rankine, reheat, regenerative, Otto, and Diesel. Also covered are refrigeration cycles, the basics of psychrometry, and the thermodynamics of combustion. Prerequisite(s): 23.241. Credits: 3 (3.0)

23.262 ENGINEERING DATA ANALYSIS

This course introduces students to basic statistical techniques, probability, risk analysis, and predictive modeling, and how they impact engineering and manufacturing activities in both analytical and forward looking activities. Topics covered basic statistics, probability, combinations, permutations, regression, correlation, and predictive model development with the objective of building working statistical models for a technical environment. Prerequisite(s): 92.126, Proficiency in MS Excel or equivalent. Credits: 3 (3.0)

23.295 MATERIALS SCIENCE

Properties of materials, selection of materials and processing of materials for appropriate application are the focus of this course. Case studies are utilized to demonstrate failures which need not have occurred. Materials which are considered include metals and alloys, ceramics polymers, composites, wood and concrete. Materials demonstrations will be part of the class lectures. Prerequisite(s): 99.131. Credits: 3 (3.0)

23.301 MANUFACTURING TECHNOLOGY LABORATORY

This course presents fundamentals of manufacturing processes with the emphasis on machine shop operations. Problems in design, tooling, and production aspects of manufacturing are considered. Hands-on machining operations are performed in a basic machine shop. Prerequisite(s): 23.101. Credits: 2 (3.0)

23.302 MECHANICS/MATERIALS LABORATORY

Methods of material testing and analysis are covered in this course with an emphasis on proper measurement procedures, data reduction, and presentation. Lectures cover the background required to perform post laboratory calculations, and overview measurement techniques, laboratory result reporting, and formal presentations that are given by students to the class. Prerequisite(s): 23.222, 23.223, 42.226. Credits: 2(3.0)

23.305 MANUFACTURING PROCESSES

The course will focus upon a variety of manufacturing processes used for metals, ceramics and plastics, material interactions that occur during manufacturing, mechanical test methodology and material response to stress at different temperatures, methods to select appropriate processes to achieve product specification and methods to investigate process history based on material properties. Prerequisite(s): 23.301 or equivalent. Credits: 3 (3.0)

23.314 MANUFACTURING PRODUCTIVITY

The course will focus upon three primary categories of manufacturing improvement: theory of constraints/workflow, work definition and design, and quality improvement. Each student should understand and be conversant in the principles of productivity, lean manufacturing and able to lead a productivity improvement project upon successful completion of the course. Case studies will be used to illustrate the proper implementation of productivity improvement principles. Credits: 3 (3.0)

23.320 MACHINE DESIGN

This course first briefly discusses materials strength and deformation, fracture toughness, and stress intensity factor to build the corner stones for any machine design work. It then focuses on the design of five basic machine parts: fasteners, springs, bearings, gears and shafts. The primary subjects in this course are thread standards and definitions, the mechanics of power screws, threaded fasteners, analyses and design of springs, fatigue loading, bearing types, bearing life, bearing load, selection of bearings, thin film lubrication, hydrodynamic theory of lubrication, gear conjugate action, contact and interference of gears, shaft design and analyses. Prerequisite(s): 23.222, 23.223. Credits: 3 (3.0)

23.353 FORENSIC ENGINEERING

This course is a survey of forensic engineering with particular emphasis on using engineering science and technology to investigate and reconstruct failures of engineered systems. Topics include qualifications of the forensic engineer, the scientific method, failure hypotheses, levels of confidence, physical evidence, field investigation techniques, examination and testing, codes and standards, and personnel safety. Other topics include ethics, the hired gun, junk science, the legal process, introduction to expert witness testimony, trial exhibits, Frye and Daubert decisions, bias, forensic engineering practice, and engineering reports. Credits: 3 (3.0)

23.354 PROBLEMS IN MECHANICAL ENGINEERING TECHNOLOGY

The course provides the student with analytical skills necessary to solve a variety of engineering problems. Lectures consist of review and extension of concepts taught in statics, dynamics, mechanics of materials and machine design with emphasis on applying that knowledge to solve engineering problems. Students become proficient with advanced topics such as multiaxial stress-strain calculations, strain energy, impact, failure analysis and various solution techniques in vibrations. Prerequisite(s): 92.225, 23.320, 23.221, 23.222, 23.223. Credits: 3 (3.0)

23.402 ENGINEERING MEASUREMENT LABORATORY

This course provides hands-on experiments that are designed to teach the fundamentals of instrumentation devices and experimental techniques. Basic physical principles of theory that apply to the mechanical engineering technology student are covered for purposes of verifying experimental techniques and teaching the importance of experimental result verification. This course allows students to: 1) assemble measurement systems which include transducers, signal condi-

tioners, and data acquisition systems; 2) conduct experiments on relevant mechanical systems; 3) data verifications using theoretical models. Effective written and verbal communication techniques are also emphasized throughout the course. Prerequisite(s): 23.222, 23.241, 23.242. Credits: 2 (3.0)

23.414 ENGINEERING ECONOMICS

This course introduces students to accounting and finance operations and principles, and how they impact engineering and manufacturing activities in both analytical and forward looking planning activities. Topics covered include financial statements, costing, depreciation, time value of money, cash flows, capital budgeting, and capital recovery with the objective of building working financial models for a technical environment. Prerequisite(s): 49.201 Economics I or instructor's permission. Proficiency in MS Excel or equivalent. Credits: 3 (3.0)

23.416 STATISTICAL QUALITY CONTROL

This course studies traditional and current statistical techniques applied to the solution of quality problems and quality improvement activities. Topics include an examination of the development of SQC as a discipline, statistical evaluation, process stability, process capability, design and use of control charts, and sampling plans. Credits: 3 (3.0)

23.419 APPLIED COMPUTER AIDED MANUFACTURING

This course is an introduction to computer aided manufacturing with an overall perspective focusing on the design process and how computer technology has affected the modern manufacturing environment. Introduces students to computer aided design systems, process engineering, basic tooling design, machining, programmable logic controllers (PLC), fundamentals of numerical control (NC), process planning, and concurrent engineering with the objective of design optimization for manufacturing and commercialization. Prerequisite(s): 23.200, 23.301. Credits: 3 (3.0)

23.451 SIX SIGMA

The Six Sigma methodology is a problem-solving strategy that offers a road map for changing data into knowledge, reducing the amount of daily firefighting, and uncovering opportunities that impact both the customer and the bottom line. In this introductory course, the emphasis will be on learning how to apply the Six Sigma tools and road map, DMAIC (Define, Measure, Analyze, Improve and Control), to the student's Six-Sigma project (Transactional or Manufacturing). The student will learn process mapping, measurement system analysis, FMEA, and how to apply statistical analysis techniques using Minitab Statistical software. Prerequisite(s): 23.262. Credits: 3 (3.0)

23.475 HEAT TRANSFER

This course focuses on the study of the fundamentals of heat transfer. Case studies are utilized to enhance the students' knowledge of the basic principles of heat transfer and to develop their problem-solving ability in conduction, convection and radiation heat transfer. Prerequisite(s): 23.241, 23.342. Credits: 3 (3.0)

23.480 COMPUTER AIDED DESIGN

Using Autodesk Inventor software, this course is a continuation of 23.200, Computer Aided Drafting. This course introduces 3D CAD techniques to demonstrate and utilize 3D parametric modeling in the design process. Solid models will be constructed, used to create assemblies, and drawings. These models, assemblies, and drawings will be modified and optimized using advanced operations. A design project and written report are required. Prerequisite(s): 23.200. Credits: 3 (3.0)

23.484 INTRODUCTION TO PRO/ENGINEER

This course introduces the user to the principles of Pro/ENGINEER, solid modeling, and parametric design. It is a hands-on project and exercise-based course. Topics will include: feature-based parametric solid modeling, pick and place features, sketched features, the basics of creating parts and assemblies, and drawing creation. Advanced topics will include 3-D sweeps, helical sweeps, and blends. Prerequisite(s): 23.200. Credits: 3 (3.0)

23.485 INTRODUCTION TO SOLIDWORKS

This course introduces the student to the use of CAD for construction of basic shapes and multiview drawings. It is a project oriented course introducing the student to graphic design using SolidWorks. SolidWorks is a three dimensional solid modeling program used to produce computer design models. Prerequisite(s): 23.200 or some experience with another CAD program is required. Credits: 3 (3.0)

25.130 INTRODUCTION TO NANO-ENGINEERING

The multi-billion dollar investment in nanoscience and nanotechnology is beginning to yield new products, including better sunscreens and wear-resistance materials. "Introduction to Nano-Engineering" is as overview of engineering at the nanoscale, including measurement techniques, nanoelectronics, nanomaterials, design of nanodevices, nanomanufacturing, and the societal impact of nanotechnology. "Lecture" material is accompanied by open-ended questions for chatroom discussion and five virtual laboratories. Targeted for the general public. This is an interdisciplinary course. Credits: 3 (0.0)

27.201 PLASTICS MATERIAL SCIENCE I (COMMODITY THERMOPLASTICS)

Serves as an introductory course reviewing the history, classification, definitions and terminology, raw materials, methods of manufacturing, testing-characterization of typical physical properties, and end-uses of polymeric materials systems. Emphasis will be on the commodity thermoplastics, polyolefins, vinyls and styrenics. Credits: 3 (3.0)

27.202 PLASTICS MATERIAL SCIENCE II

Presents a continuation of 27.201, emphasizing engineering thermoplastics, nylons and acetals, acrylics and cellulosics, polycarbonates, polysulfones, modified PPE, polyesters, fluoropolymers, polyamides, PPS, PEI and LCPs, copolymers, alloys and blends. Discussions will review the chemistry, properties, process ability and design limitations of these high-performance engineering and specialty polymers. Prerequisite(s): 27.201. Credits: 3 (3.0)

27.203 PLASTICS MATERIAL SCIENCE III (THERMOSETTING RESIN)

Provides an in-depth review of the major families of thermosetting resins: phenolics, aminos, polyesters, epoxies, silicones, and various polyurethane systems. Emphasis is on basic chemistry, inherent physical properties and process ability, and the effect of incorporating fillers, reinforcements, colorants, lubricants, and other chemical additives in order to engineer-in necessary processing ease, and to meet functional performance end-use demands. Prerequisite(s): 27.202. Credits: 3 (3.0)

27.219 INTRODUCTION TO PLASTICS PROCESSING

This introductory course focuses on the bulk properties and rheological behavior of polymers which affect processability. Lectures will review basic equipment, including drives, heater bands, various instrumentation (thermocouples and pressure transducers), and barrels & screws. Laboratory sessions will also blow molding and thermoforming while providing a seamless transition to the principles of extrusion and injection molding courses. Credits: 3 (3.0)

27.301 ADDITIVES FOR POLYMERIC MATERIALS

Presents an analysis of additives including stabilizers, plasticizers, fillers and reinforcements, biocides, flame retardants, anti-static agents, and release agents. Special emphasis will be placed on the characteristics of each type of additive, compatibility interactions and effects on processing. A review of the most current methods of testing efficiency of each additive system will also be covered. Credits: 3 (3.0)

27.331 PRINCIPLES OF INJECTION MOLDING

This course is an overview of the injection molding industry - its productivity, utilization, and yield - as well as an introductory discussion of applicable materials for injection molding, the theories of plastication and morphology, and the industrial standards used to specify the types of injection molding machinery, safety considerations, and recent innovations in injection molding processing technologies. Credits: 3 (3.0)

27.332 ADVANCED INJECTION MOLDING

Comprehensive review of the injection molding process is combined with discussions of the underlying engineering principles as well as their application in the molding environment. Discussion of the basics of the process and practical analysis which may be applied to improving efficiency in the molding shop. Prerequisite(s): 27.331. Credits: 3 (3.0)

27.333 POLYMER PROCESSING

This course provides an introduction to the major industrial processes used to manufacture products from commercial thermoplastic materials. Topics covered in the course include the processing behavior of thermoplastic materials, and the primary manufacturing processes including compounding and mixing, single- and twin-screw extrusion, injection molding and injection molding variants (multi-shot, gas-assisted and co-injection), blow molding and thermoforming. Attention is also given to the function, design and characterization of the plasticating screw systems used in the primary processes, power and energy consumption, and the cooling processes used to finalize the finished products. Credits: 3 (3.0)

27.341 EXTRUSION DIE DESIGN

Fundamental principles of extrusion die design and die technology. Both theoretical and practical applications of extrusion dies are discussed, including materials of construction. Die types covered in the course include blown film, flat film, sheet, tubing, pipe, wire coating and profile dies. Concepts related to viscous fluid flow and elastic effects, as it relates to die swell, are covered. Credits: 3 (0.0)

27.343 PRINCIPLES OF COMPOUNDING

This course, involving both lectures and demonstration laboratory sessions, focuses on the technology, economics, and challenges of extrusion compounding. Basic rheological behavior, the fundamentals of polymer modifiers and additives, and the influence of equipment design (two-roll mill, single- and twin-screw extrusion, and continuous mixers, as well as intensive mixing equipment) will be detailed. Credits: 3 (3.0)

27.344 PRINCIPLES OF DIE DESIGN

Please visit the Continuing Studies website or log on to ISIS for the course description.

27.345 PRINCIPLES OF EXTRUSION

This course, involving both lectures and demonstration laboratory sessions, is an overview of the extrusion industry. The basic concepts of extrusion will be developed through commercial applications such as the manufacturing of film and sheet, profile, tubing and piping, and fibers. Basic compounding technologies, including single- and twin- screw extrusion will be examined. Credits: 3 (3.0)

27.373 PLASTICS MOLD DESIGN I

Explores material in both the class and laboratory format. Topics include an introduction to the principles of basic mold and die design and construction and laboratory design of molds and/or dies to be constructed in continuing portions of this course. Lecture, laboratory and demonstrations will be offered at the discretion of the instructor. Credits: 3 (3.0)

27.375 INJECTION MOLDING SIMULATION USING MOLDFLOW™

This course provides students with the necessary understanding and skills to utilize in practice Moldflow's injection molding simulation software during the design to manufacturing process of injection molded plastic parts. Credits: 3 (3.0)

27.376 PLASTIC MOLD ENGINEERING II

Serves as a continuation of 27.373. Prerequisite(s): 27.373. Credits: 3 (3.0)

27.403 PHYSICAL PROPERTIES OF POLYMERS I

Introduces basic mechanical properties of polymers as linear viscoelastic materials. The concepts of creep, stress relaxation, and superposition principles are

emphasized. Dynamic mechanical behavior, interrelations between various properties, electrical behavior, miscellaneous mechanical properties, and optical properties will also be covered. Credits: 3 (3.0)

27.404 PHYSICAL PROPERTIES OF POLYMERS II

Serves as a continuation of 27.403. Prerequisite(s): 27.403. Credits: 3 (3.0)

27.406 POLYMER STRUCTURES / PROPERTIES

Presents the fundamental relationship between molecular structure, properties, and end-use application of plastics materials. Molecular structural features include chemical composition, molecular size and flexibility, intermolecular order and bonding, and super molecular structure. Properties to be covered include process ability, mechanical, acoustic, thermal, electrical, optical and chemical properties, price, and balance of properties. Applications to be discussed include rigid solids, flexible solids, foams, film, and non-plastic applications. Credits: 3 (3.0)

27.407 PLASTICS INDUSTRY ORGANIZATION

Discusses the economics of producing plastics raw materials and converting them into end products, from research and development to plant construction, operation and marketing. Market analysis of plastics production, processing, and consumer patterns: commercial development, sales, and technical service will be addressed. Organization of the plastics industry for research and development, specialty and commodity production, profit and growth will also be presented. Credits: 3 (3.0)

27.418 PLASTICS PRODUCT DESIGN

Discusses the theoretical principles and sound engineering practices involved in the design of new end products made from polymers, applying the total systems approach to the balance between product design, choice of materials, tool design, and process techniques, as they affect competitive choices for commercial success. A semester project is required. Credits: 3 (3.0)

27.425 DYNAMIC MECHANICAL PROPERTIES OF PLASTICS I

Focuses on the principles, experimental techniques, and investigative strategies for characterizing the viscoelastic behavior of polymers using dynamic mechanical techniques. Lectures and demonstrations will review the methodology for identifying the important theological characteristics of polymeric solutions, melts, and solids. Comparisons with other, more traditional practices will be established for quality of data, sensitivity of macromolecular architecture, and components of materials engineering. Credits: 3 (3.0)

27.426 DYNAMIC MECHANICAL PROPERTIES OF PLASTICS II

Serves as a continuation of the 27.425 introductory course. Credits: 3 (3.0)

27.440 COMMERCIAL DEVELOPMENT OF PLASTICS

The concepts of industrial marketing will be reviewed for research, pricing strategies, and product planning for market segmentation, place (distribution), and promotional activities. Topics will include creating a demand, selling, and servicing base resins and additives. Credits: 3 (3.0)

27.451 SELECTED TOPICS I

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.452 SELECTED TOPICS II

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.453 SELECTED TOPICS III

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.454 SELECTED TOPICS IV

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.455 SELECTED TOPICS V

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.456 SELECTED TOPICS VI

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.457 SELECTED TOPICS VII

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

27.458 SELECTED TOPICS VIII

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. Credits: 3 (3.0)

30.160 INTRO. TO EMERGENCY MEDICAL TECH.

Course covers trauma care including injuries to the head, neck, spine, chest, abdomen, and extremities. Medical care of heart attacks, strokes, diabetics, poisons, overdoses, seizures, and communicable diseases. Also covered are childbirth, pediatrics, exposure to the elements, hazardous materials and auto extrication. Cardiopulmonary resuscitation is a prerequisite for this course. Credits: 6 (6.0)

30.201 COMMUNITY HEALTH

This course emphasizes the concepts, philosophy, and principles of public health and their relationship to the physical, mental, and social well being of the community. The focuses are on the prevention of disease, the promotion and maintenance of health, and the provision of environmental and personal health services through organized community effort. Credits: 3 (3.0)

30.305 EXERCISE PHYSIOLOGY LECTURE

This course is designed to enable students to understand the acute and chronic physiologic effects of exercise on the human body. Topics will include bioenergetics, cardiopulmonary and cardiovascular physiology, neuromuscular physiology, special populations, and exercise prescription for apparently healthy athletic and clinical populations. Special topics in exercise physiology and environmental physiology will also be covered. Prerequisite(s): Anatomy & Physiology, Chemistry. Credits: 4 (3.0)

30.306 INTRODUCTION TO GERONTOLOGY

This course examines human aging from a multidisciplinary and developmental perspective. The course will focus on the adult years of the life span. The social-psychological factors involved in adjustments to the aging process, to retirement, to family, to leisure, to aloneness, to death and bereavement will be discussed together with such special concerns of the elderly as widowhood, finances, religion, sexuality and health problems. Rehabilitative strategies such as remotivation and reality orientation are included. Credits: 3 (3.0)

30.307 EXERCISE PHYSIOLOGY LABORATORY

This course examines the benefits and risks of lifestyles on human physiology. Focus will include the alternatives for better health through changes in health behaviors. Credits: 1 (3.0)

30.315 KINESIOLOGY

This course combines the study of mechanics, kinematics, kinetics, anatomy and neuromuscular physiology to teach the examination and evaluation of human movement. The major focus of the course is in qualitative evaluation of movement. Topics also include quantitative evaluation, body mechanics, posture and gait evaluation with a focus on identification of abnormal movement patterns. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Prerequisite(s): Two semesters of each: Anatomy and Physiology, Physics. Credits: 3 (3.0)

31.201 COMMUNITY HEALTH AND ENVIRONMENT

This course emphasizes the concepts, philosophy, and principles of public health and their relationship to physical, mental, and social well-being of the community. The focus is on the prevention of disease, the promotion and maintenance of health, and the provision of environmental and personal health services through organized community effort. Credits: 3 (3.0)

33.301 RESEARCH AND HEALTH CARE

This course focuses on the research process, examples of knowledge derived from health research, and the application of this knowledge. Health care research interests and methodology of various disciplines are examined. This course can be taken prior to but no later than the fifth semester. Credits: 3 (3.0)

35.101 HUMAN ANATOMY AND PHYSIOLOGY I

This course provides a basic knowledge of the structure and function of the human body. An overview of the general organization of the body introduces the course. Following a discussion of basic human chemistry, the anatomy and physiology of cells, tissues, organs, and organ systems are studied with special emphasis placed on homeostasis and interaction among the various systems. The topics treated are body plan, chemistry, cytology, histology, the integumentary system, the skeletal system, the muscular system, and the nervous system. Clinical applications will be presented. Prerequisite(s): Corequisite: 35.103. Credits: 3 (3.0)

35.102 HUMAN ANATOMY AND PHYSIOLOGY II

A continuation of the basic knowledge of human structure and function. The topics treated are cardiovascular system, lymphatic system, respiratory system, endocrine system, digestive system, metabolism, urinary system, and reproductive system. Prerequisite(s): 35.101, 35.103 (or equivalent). Corequisite: 35.104. Credits: 3 (3.0)

35.103 HUMAN ANATOMY AND PHYSIOLOGY LABORATORY I

Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to discuss conclusions. Prerequisite(s): Corequisite: 35.101. Credits: 1 (3.0)

35.104 HUMAN ANATOMY AND PHYSIOLOGY LABORATORY II

Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to analyze results and discuss conclusions. Prerequisite(s): 35.101, 35.103. Corequisite: 35.102. Credits: 1 (3.0)

35.206 HUMAN NUTRITION

This course provides an overview of nutrition and the components of a nutritious diet during the various stages of the life cycle. It emphasizes the impact of nutrition on the major contemporary health problems in the United States. Nutrition issues, trends and research, and their effect on society and the legislative process will be explored. Credits: 3 (3.0)

35.207 FITNESS AND NUTRITION

Course is primarily designed for students with limited experience in the field of nutrition and fitness. The course will introduce students to concepts related to the digestive process, metabolism, nutritional requirements, fitness profiles, fitness prescriptions, weight management, and eating disorders. This survey of relevant topic areas related to nutrition and fitness will prepare students for more advanced nutrition courses. Prerequisite(s): 35.206. Credits: 3 (3.0)

35.211 BASIC CLINICAL MICROBIOLOGY & PATHOLOGY

Studies the fundamentals of microbiology with major emphasis on structure, function, growth, metabolism,

and classification of clinically important microorganisms. The human body's response to invading microbes and an introduction to the ecological aspects of microorganisms in the environment with particular stress on their significance, activities (beneficial and detrimental) and control measures will also be studied. Prerequisite(s): 35.102, 35.104. Corequisite: 35.213. Credits: 3 (3.0)

35.213 BASIC CLINICAL MICROBIOLOGY & PATHOLOGY LABORATORY

Laboratory investigations of basic properties and characteristics of microorganisms are conducted. Students will perform commonly used techniques for collecting, handling, and studying clinically important microorganisms. Prerequisite(s): 35.102, 35.104. Corequisite: 35.211. Credits: 1 (3.0)

35.356 PHARMACOLOGY

Introduces the chemistry, biochemistry, and physiological actions of various pharmaceuticals. Fundamental concepts will be stressed and will include a discussion of drug receptors, drug receptor interactions, pharmacokinetics, enzyme induction, drug metabolism, drug safety and effectiveness, and idiosyncratic reactions. Several major groups of drugs will be studied including: central nervous system stimulants, hypnotics, narcotic analgesics, anti-inflammatory drugs, cholinergics, adrenergics, adrenergic blocking drugs, antihypertensives, antihistamines, diuretics, adrenal steroids, antianemic drugs, and antibiotics. Articles from current literature will be discussed. Prerequisite(s): 35.252. Credits: 3 (3.0)

36.350 HUMAN BIOCHEMISTRY

This course is an in-depth study of biochemical substances and their reactions in the body, with major emphasis placed on metabolism at the cellular level and examined in the tissues of the various organs where these reactions occur. Correlation of biochemical processes underlying pathologic conditions will be made whenever practical. Prerequisite(s): 35.252 or equivalent. Credits: 3 (3.0)

36.371 ADVANCED HUMAN NUTRITION

Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of nutrients. Nutrient requirements are evaluated in the context of their physiological and biochemical functions. Prerequisites: 35.206 Prerequisite(s): 35.206. Credits: 3 (3.0)

36.372 OBESITY & WEIGHT CONTROL

Etiology, pathophysiology, and treatments of obesity, anorexia nervosa, and bulimia are reviewed. Role of hereditary, neurological, metabolic, and environmental mechanisms are discussed. Particular emphasis on obesity. Prerequisite(s): 35.206. Credits: 3 (3.0)

36.414 INFECTIOUS DISEASE

The course is designed for students in the health and biological sciences and is offered for both undergraduate and graduate students. A general microbiology course is advised as a prerequisite. The focus of the course is the pathophysiology of infectious disease. Major infectious organisms will be discussed as biological models and presented in the way they affect major systems of the body. Emphasis will be placed on significant episodes of emerging infections and current technology in diagnosis and treatment of infectious disease in the new millennium. Prerequisite(s): One semester of General Microbiology. Credits: 3 (3.0)

41.103 INTRODUCTION TO PARALEGAL STUDIES

Familiarizes students with the role of a paralegal in both the public and private sector. Other topics will include principles of jurisprudence and basic legal concepts and terminology. Credits: 3 (3.0)

41.234 CRIMINAL LAW

Studies substantive criminal law, with emphasis on general principles of criminal culpability, such as the act requirement, the mens rea requirement, and causation. The course will also cover the law of attempted crimes, accomplice liability, and defenses. The elements of specific crimes, such as homicide, burglary, robbery, and larceny will be studied in depth. Credits: 3 (3.0)

41.262 INTRODUCTION TO BUSINESS LAW

Introduces the student to the fundamentals of criminal and tort law. The main emphasis is on all aspects of contract law including the agreement consideration, writing third-party rights, illegality, performance, and remedies. Also covered is agency law concerning all situations where one party is working for another in the business world. This course is highly recommended for pre-law students, CPA's, and paralegals. Credits: 3 (3.0)

41.348 WILLS, TRUSTS & ESTATES

Encompasses the law of wills, intestacy, trusts, and gifts. Federal and state gift and estate taxes will be examined. Students will learn and practice the tasks and skills needed for estate administration and probate forms, petitions and inventories, and complete federal, state and gift tax returns. This is a hands-on course where students will complete an entire estate administration from will drafting to final inventory. Credits: 3 (0.0)

41.363 CORPORATE AND PROPERTY LAW

Studies the law and its impact on the business world. Partnerships, limited partnerships, and joint ventures are studied at the outset of the course. The main emphasis is on elements of the corporate structure. The last part of the course deals with personal and real property with coverage of wills and trusts. This course is highly recommended for pre-law students, CPA's, and paralegals. Credits: 3 (3.0)

41.365 THE LEGAL ENVIRONMENT OF BUSINESS

Deals with the manager's role in understanding and determining the firm's relations with government and society. Topics relating to government include the tax and regulatory provisions of local, state, and federal agencies. Some of the regulatory provisions studied include provisions governing licensing and mergers. The antitrust laws are also examined. Topics relating to society include the social cost of business, civil rights, business ethics, and problems in ecology. Credits: 3 (3.0)

41.366 INTERNATIONAL LAW

Introduces the body of international rules, customs, and regulations which are in force between nations. Specific legal issues involving a study of multinational, cultural, political, economic, and ethnic perspectives are addressed. Topics covered include human rights, war prevention, foreign policy, tort and criminal liability, business trade practices, and dispute settlement. Recommended at the senior level. Credits: 3 (3.0)

41.367 ENVIRONMENTAL LAW

Examines the legal and administrative problems of protecting the quality of the human environment. Federal and state legislation on environmental policy is studied. Public interest litigation as a supplement to the enforcement of environmental law is discussed. Places emphasis on the law as a means of protecting the environment. Credits: 3 (3.0)

41.368 EMPLOYMENT & LABOR LAW

Discusses legislative and judicial decisions and the Department of Labor's administrative rulings relative to the management-labor process. Reviews the sources of labor law and employer and union unfair labor practices. Emphasizes the Occupational Safety Health Act, the Civil Rights Act, the Equal Opportunity Act, and the National Labor Relations Act. Credits: 3 (3.0)

41.370 REAL ESTATE LAW

Examines contracts for the sale of real estate, deeds, title examinations, security for real estate transactions, methods and problems of co-ownership, zoning ordinances, brokerage contracts, leases and landlord and tenant rights and liabilities. Credits: 3 (3.0)

41.376 FAMILY LAW

Studies the critical family law issues facing society today. Subject matter examined includes the law of marriage, custody, adoption, divorce, child support, juveniles, right to die, fetal tissue transfer to prolong the life of another, reproduction control, and surrogate parenting. This course is taught from a legal and human values perspective. Credits: 3 (3.0)

41.379 THE RELATIONSHIP OF LAW, LOGIC, AND ETHICS

Examines the impact of ethical viewpoints on the structure of legal doctrines. It stresses the fact that the study of law is a study of ethics as well as logic. Credits: 3 (3.0)

41.381 WOMEN AND THE LAW

Presents issues that particularly affect women. Topics include: sex discrimination, sexual harassment, marriage, divorce, reproductive control, surrogate motherhood, and custody. Credits: 3 (3.0)

41.387 LEGAL RESEARCH METHODS

Designed to introduce the student to the fundamentals of legal research and writing. The student will gain hands-on experience in legal research and in the reporting of such research in case briefs and memoranda. Emphasis will be placed on the case law and statutory law of the Commonwealth of Massachusetts. Credits: 3 (3.0)

41.390 LITIGATION

Examines the practices and procedures involved in the litigation process. Topics include: legal research, courts and jurisdictions, evidence and discovery, pleadings, motions, depositions, trials and appeals, and federal rules of procedure. Credits: 3 (3.0)

41.392 WILLS, TRUSTS, AND ESTATES

Encompasses the law of wills, intestacy, trusts, and gifts. Federal and state gift and estate taxes will be examined. Students will learn and practice the tasks and skills needed for estate administration and probate forms, petitions and inventories, and complete federal, state and gift tax returns. This is a hands-on course where students will complete an entire estate administration from will drafting to final inventory. Credits: 3 (3.0)

41.393 NURSING MALPRACTICE

This course is designed to provide the student with a basic understanding of malpractice, with a specific emphasis on the field of nursing. Topics of study and discussion will include an overview of the malpractice process and what to do if you are sued as well as risk management and ways to minimize the risk of being sued. The course will include case studies and a review of recent court decisions. Credits: 3 (3.0)

41.394 ANCIENT LEGAL SYSTEMS

This course will examine some of the most important sources for our knowledge of ancient legal systems, including basic texts of religious law in the Jewish, Christian, Hindu, and Buddhist traditions. After introducing the historical and social background of these texts, our main goal will be to develop an appreciation for how they function as legal codes or systems of law. We will discuss primary sources, beginning with portions of the Hebrew Bible, Dante's Inferno, and the Hindu Laws of Manu, as well as secondary interpretations, such as those of Sir Henry Maine, mile Durkheim, Michel Foucault, and Mary Douglas. Modern theories of law, including Jeremy Bentham's theory of punishment and J. L. Austin's theory of the "performative" nature of legal and other types of language, will be addressed in light of our examination of ancient legal systems. Discussion will focus on the following topics: the relationships among law, religion, ritual, and magic; law as a form of social organization and control; theories and depictions of punishment and retribution; the poetic structure of legal language; and the purpose and function of a legal system. No prior knowledge of the subject is required, and all texts will be available in English. Credits: 3 (3.0)

41.490 LEGAL ASPECTS OF CYBERSPACE

The growth of the Internet has created two parallel universes each with its own set of rules and reality: real space and cyber space. Traditional notions about privacy, defamation, contracts, freedom of expression, pornography, stalking, jurisdiction and intellectual property are challenged by the latest cyberspace technology. Much of the debate about control, which leads to questions about rights and responsibilities, centers around who, if anyone, should design the architecture of cyberspace, i.e., the "code". These and other topical subjects serve as the focus on the study of legal issues in cyberspace. Credits: 3 (3.0)

41.497 THE PARALEGAL PRACTICUM

Assigned fieldwork under the supervision and with the permission of the coordinator. This course is designed to broaden the educational experience of paralegal students by providing exposure to selected legal environments such as corporate legal departments, financial institutions, law firms, real estate departments, banks, and government agencies. This course is intended to provide a correlation of theoretical knowledge with practical experience in an area of particular interest to students. Prerequisite(s): Minimum of 3 paralegal courses and permission of Legal Studies Coordinator. Credits: 3 (3.0)

42.100 COLLEGE WRITING A

Provides an intensive review of the basic rules of grammar and the basic principles of rhetoric necessary for success in College Writing I. Credits: 3 (3.0)

42.101 COLLEGE WRITING I

Examines the writing process and reviews fundamentals of grammar, sentence structure, and paragraph development. Students analyze rhetorical models by professional writers and are introduced to library research and techniques of documentation. Students write expository essays. Credits: 3 (3.0)

42.102 COLLEGE WRITING II

Reinforces the principles of good writing established in College Writing I. Students submit six essays based on critical analysis of readings in fiction, drama, and poetry. One documented research paper is required. Prerequisite(s): 42.101. Credits: 3 (3.0)

42.103 COLLEGE WRITING I FOR INTERNATIONAL STUDENTS

Serves as the equivalent to 42.101, for students who speak English as a second language. Credit for both 42.101 and 42.103 may not be granted. Credits: 3 (3.0)

42.104 COLLEGE WRITING II FOR INTERNATIONAL STUDENTS

Serves as the equivalent to 42.102, for students who speak English as a second language. Credit for both 42.102 and 42.104 may not be granted. Prerequisite(s): 42.103. English composition requirement. Credits: 3 (3.0)

42.201 GREAT BOOKS OF ANTIQUITY

Studies representative literary selections from the Hebrews, the Greeks, the Romans, and other societies of the ancient world. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.211 POETRY

Studies selections from the Renaissance through contemporary periods. Prerequisite(s): 42.102 Credits: 3 (3.0)

42.212 THE SHORT STORY

Studies the development of the short story from Poe and Chekhov to the present. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.217 THE HORROR STORY

Explores the genre from Poe to the present. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.221 WRITING FOR INTERACTIVE MEDIA

Adds new dimensions to traditional, text-based writing. Hypertext links allow for multiple story lines, while integrating audio, animation, and video presents new challenges for the writer. Participants will examine successful multimedia scripts and work on their own creations. Credits: 3 (3.0)

42.224 BUSINESS WRITING

Studies the theory and practice of writing letters, memoranda and reports on specific business and technical problems. Registration preference for students enrolled in Business programs. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.226 TECHNICAL AND SCIENTIFIC COMMUNICATION

Studies the theory and practice of letters, memoranda, reports and oral presentations on specific scientific and technical problems. Prerequisite(s): 42.102. Credits: 3 (0.0)

42.232 TURNING FICTION INTO FILM

Often when we encounter narratives (in the movies or in books) we tend to practice a "suspension of disbelief" letting the story unfold, following the conventions of film and fiction without question This course will direct our critical focus on the mechanisms through which writers and filmmakers convey meaning to their audiences. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.243 CONTEMPORARY WOMEN WRITERS

Contemporary Women Writers introduces students to American women writers of the last fifty years. We examine the historical, socio-cultural, political, and personal influences on these writers' work by studying trends and events in recent American history and themes reflected in the works. By studying contemporary women's writing in this contextualized fashion, students can appreciate larger trends in our society, the role writing plays in examining such trends, and the value of literature as an exploration of human growth and struggle. Through discussion, group collaboration, critical analysis, and by designing their own graphic organizers, students gain a breadth of knowledge in the following areas: the themes and stylistic concerns of contemporary American women writers; the key historical events that influence contemporary American women's writing; the critical reading of literary texts. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.250 THE BIBLE AS LITERATURE

Presents a literary and historical analysis of selected Old and New Testament books. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.253 THE CULTURE OF AMERICAN SPORT

An examination of the history, literature, sociology, and aesthetics of sport. Attention to corollary issues and values including racism, sexism, and violence. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.267 INTRODUCTION TO SHAKESPEARE

A study of selected histories, comedies, and tragedies. Not for English majors. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.274 THE LITERATURE OF THE BEAT MOVEMENT

Explores both the writings and the personal lives of a loose confederation of poets, novelists, and essayist who emerged onto the American literary and cultural scene following World War II and who came to be known as the -Beat Generation.+ The primary focus will be on the life and writings of Lowell native Jack Kerouac (1922-1969) with others of the -beat circle+ included as well, i.e., Allen Ginsberg, William Burroughs, Diana DiPrima, etc. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.278 LITERATURE OF THE VIETNAM WAR

In this course, the student will read some of the best known contemporaneous Vietnam War narratives, study personal choices from the genre, analyze text in an understanding of its time and place, and study the impact of this war on United States literature, society, culture and myth. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.282 CRIME IN LITERATURE

Offers a study of how various authors use crime as a plotting device to study character, reveal social order, and criticize social institutions. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.291 HISTORY OF ENGLISH LITERATURE I

A survey of representative writers and works from the Anglo-Saxon period to the mid-seventeenth century. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.294 HISTORY OF AMERICAN LITERATURE I

Studies the historical development of American literature from the Colonial period to the Civil War. Selected works by representative authors from each period are studied. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.295 HISTORY OF AMERICAN LITERATURE II

Studies the historical development of American literature from the Civil War to World War I. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.300 INTRO TO JOURNALISM

An introduction to techniques of writing for the news media. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.302 CREATIVE WRITING: FICTION

Studies the theory and practice of fiction. Conducted as a workshop with close analysis of student work. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.303 CREATIVE WRITING: POETRY

Discusses the theory and practice of poetry. Conducted as a workshop with close analysis of student work. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.304 CREATIVE WRITING: PLAYWRITING

Studies the theory and practice of playwriting. Conducted as a workshop with close analysis of student work. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.306 PROFESSIONAL WRITING

In this course, which will rely heavily on group interaction, students will study the fundamentals of effective creative writing (word economy, consistent voice, character and place description), through the sharing and discussion of both their own written works and the selected writings of other authors, of both fiction and non-fiction. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.310 WRITING POPULAR FICTION

This course is designed for students who are interested in writing in one or more of the popular forms of genre fiction: the mystery, the horror story, science fiction, fantasy, romance, and the thriller. Class time will be spent discussing and work-shopping student writing. Some time will also be devoted each week to brief lectures on practical matters like choosing between the short story and the novel, finding ideas, constructing plots, building characters, pacing, generating suspense, and marketing one's work. In addition, there will be assigned readings to illustrate the above. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.314 WRITING MYSTERIES

This course is designed for students who are interested in writing their own mysteries. Part of the course time will be spent discussing and workshopping student writing with emphasis on structure, plot and character. Time also will be spent studying the work of established mystery writers. Prerequisites: 42.102 Prerequisite(s): 42.102. Credits: 3 (3.0)

42.320 PERSONAL AND REFLECTIVE WRITING

A workshop format encourages peer criticism of individual writings and discussion of models from various texts. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.348 MODERN AMERICAN DRAMA

A study of such playwrights as O'Neill, Odets, Wilder, Williams, and Miller. Credits: 3 (3.0)

42.351 LITERATURE OF THE MIDDLE AGES

A study of the prose, poetry, and drama of England from 1200-1500 set against cultural and historical backgrounds. Prerequisite(s): 42.102 or 42.104. Credits: 3 (3.0)

42.370 CONTEMPORARY AMERICAN FICTION

Discusses novels and short fiction from World War II to the present. Prerequisite(s): 42.102. Credits: 3 (3.0)

42.380 WAR IN LITERATURE

A study of conflict and human values in times of war. Focus on fiction and poetry treating World War I, World War II, and Vietnam. Credits: 3 (3.0)

42.408 PRINCIPLES OF TECHNICAL WRITING

Provides the fundamental concepts and principles of technical writing, including technical description, audience analysis, editions, document specifications and outlines, graphics, definitions and revising documents.

Writing assignments include preparing a document specification, editing and creating graphics. Prerequisite(s): 42.102. Credits: 3 (0.0)

42.412 SOFTWARE WRITING

Focuses on the document preparation process from start to finish, focusing on each stage of the process. Includes documents design, document organization, using examples and illustrations, style, creating an index and the review process. Prerequisite(s): 42.408 Credits: 3 (0.0)

42.413 ADVANCED SOFTWARE WRITING

Introduces a range of advanced topics in software writing. Topics may include electronic publishing, hyper text, advanced graphics, document set components, and working in project teams. In this course, the student selects some aspect of the computer industry that interests him/her and documents it. Prerequisite(s): 42.412. Credits: 3 (0.0)

43.105 WESTERN CIVILIZATION I

Traces the major forces in the development of European history from the beginning of Greek civilization to 1715. Credits: 3 (3.0)

43.106 THE MODERN WORLD

Examines the major forces in the development of modern European history from the French Revolution to the present. Credits: 3 (3.0)

43.107 WORLD HISTORY I

This class examines societies and cultures from ancient until early modern times with the underlying assumption that world history is an important conceptual tool for understanding our interdependent world. Course topics analyze the nature of the earliest human communities, the development of the first civilizations and the subsequent emergence of cultures in selected areas of Eurasia, Africa, and the Americas. This course also offers a consideration of issues related to the connections and relationships that shaped civilizations as a result of migration, war, commerce, and the various cultural expressions of self, society, and the cosmos before 1500. Credits: 3 (3.0)

43.108 WORLD HISTORY II

This course will introduce you to the study of world history, its relevance for living in the present, and the challenge to think critically about the emergence and subsequent development of the modern world since 1500. Participants in this course will examine experiences that transcend societal and cultural regions, focus on processes of cross-cultural interaction, and investigate patterns that influenced historical development and continue to impact societies on a global scale. Credits: 3 (3.0)

43.111 UNITED STATES HISTORY TO 1877

Traces the development of American history and institutions from Colonization to the end of Reconstruction. Credits: 3 (3.0)

43.112 UNITED STATES HISTORY SINCE 1877

Examines significant developments in American history from the end of the Reconstruction period to the present. Credits: 3 (3.0)

43.206 AMERICAN ECONOMIC HISTORY

Studies the growth and development of the American economy from its European origins to the present. Credits: 3 (3.0)

43.227 THE MIDDLE AGES

A survey of the Latin West during the formative period from the Roman Empire to the creation and development of the first European civilization. Credits: 3 (3.0)

43.237 EUROPE IN THE TWENTIETH CENTURY

An examination of selected topics in European history from 1914 to the present: World War I, the Versailles conference, unrest and collapse of collective security, the rise of Communism, Fascism, Nazism, World War II and post war developments. Credits: 3 (3.0)

43.242 THE SECOND WORLD WAR

Presents a general survey of the war, together with a closer examination of selected topics. Credits: 3 (3.0)

43.270 WOMEN IN AMERICAN HISTORY

This course surveys the history of women in the British North American colonies and United States with a special focus on social and economic change. It examines women as a distinct group but also attends to divisions among them, particularly those based on class, ethnicity/race, and regional diversity. Course themes include concepts of womanhood, the development and transgression of gender roles, unpaid work and wage labor, social reform and women's rights activism, as well as changing ideas and practices with respect to the female body. Credits: 3 (3.0)

43.274 NATIVE AMERICAN HISTORY

A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them. Credits: 3 (3.0)

43.281 SUBSAHARAN AFRICA

This survey of African history considers the legacy of the Atlantic slave trade, imperialism and its consequences and the important issues of contemporary Africa. Colonial Africa and the events leading to independence will be explored with emphasis on Senegal, Nigeria, Congo, Kenya and South Africa. Study of African novels will illuminate personal experience and issues. We will consider the modern problems of the sub-continent including development and poverty, population, disease and urbanization and the capabilities of governments and international groups. Credits: 3 (0.0)

43.308 HISTORY OF CRIME AND SOCIAL CONTROL

Analyzes the causes and development of attempts to control crime, ethnic conflict, radical protest movements, urban disorders, and attitude and role conflicts. Credits: 3 (3.0)

43.314 UNITED STATES SOCIAL HISTORY SINCE 1880

CSCDE Course Name: U.S. Social History Since 1880
A continuation of 43.313. Credits: 3 (3.0)

43.321 THE HOLOCAUST

No historical tragedy has triggered more scholarly inquiry, and popular concern, than the massacre of some six-to-eight million Jews during the period 1941-1945. The search for blame has ranged from focusing on Hitler to targeting the Nazi system as a whole and a series of higher-level henchmen guided by Hitler. Some scholars have asked whether there was something peculiarly German about the crimes. In a similar light, historians have vigorously debated the series of events that led to the construction of Auschwitz and the other extermination camps. When was the decision made to build factories designed solely to murder millions? What kind of perverse rationale could produce such a policy-one that required thousands of willing collaborators to build and man the gas chambers and crematoria? In a world in which the threat of genocide still looms, such questions remain very significant. This course will search for answers by reading the most respected scholars who have written on th subject and primary sources that speak directly to the events. Credits: 3 (3.0)

43.334 THE FRENCH REVOLUTION AND NAPOLEON

A close analysis of French society from 1600-1815 which attempts to understand the cause of the French Revolution and its aftermath. Credits: 3 (3.0)

43.336 PROBLEMS OF MODERN IRELAND

This course focuses on a discussion of the problems in Modern Irish History, how they became problems and what people have tried to do to resolve them. You will also learn about the nature of both history and human beings who have made history, and you will learn how to analyze historical issues, and come to some logical and defensible conclusion about the nature of those events and people. In this course, particularly, you will learn how to analyze events in terms of the challenges of economic, political and social claims by different groups with their competing values. Credits: 3 (3.0)

43.350 COLONIAL AMERICA: HISTORY AND CULTURE

Emphasis is on the British North American and Caribbean colonies of the 17th and early 18th centuries. Topics include: the impact of European pandemic diseases on the native American populations, new European technologies and the transformation of the environment: contrasts between religious, social, and economic developments in New England and those in the settlements to the south; a comparative analysis of slavery; and the beginnings of modernism. Credits: 3 (3.0)

43.356 CIVIL WAR AND RECONSTRUCTION

Examines the Civil War and Reconstruction, not only in terms of events but also in the light of traditional and revisionist interpretations. Credits: 3 (3.0)

43.365 UNITED STATES HISTORY SINCE 1960

Discusses Cold War politics and civil rights upheavals during the 1960's and 1970's, the decline of American economic and political power, and the resurgence of conservative politics in the 1980's. Credits: 3 (3.0)

43.370 MEDIEVAL INSTITUTIONS

This is a reasonably intensive reading seminar focusing on a number of important medieval institutions that have helped to influence our modern world. You will read a number of works in order to discuss them in detail in class. In addition, you will be required to write a review of one of three required books. Prerequisite(s): No freshman without permission. Credits: 3 (3.0)

43.373 NAZI GERMANY

This course looks at the period 1933-1945 (the period of the "Third Reich") in Germany from the perspectives of economics, politics, society, and the arts. In the course, we will read preeminent historians who have written on each of these themes in order to gain a firm understanding of the historical debates that surround the period. Specific subjects include the Nazi consolidation of power, the increasingly brutal nature of anti-Semitic policies, the power struggles among chief Nazi officials, the ideologies and personae of figures like Hitler, Rosenberg, and Goebbels, the nature of "Nazi art" and cultural policies, and the path to war. Credits: 3 (3.0)

43.374 STALIN'S RUSSIA

Spanning the period from the "October Revolution" of 1917 to Stalin's death in 1953, this course considers "Stalinist Russia" from the perspectives of economics, society, the arts, politics and war. In the course, we will read the preeminent historians who have written on these topics. Credits: 3 (3.0)

43.382 THE AMERICAN WEST

Involves readings and discussions of the history of the American frontier and the place of the frontier in American society and thought. Credits: 3 (3.0)

44.101 THE CRIMINAL JUSTICE SYSTEM

Presents a brief history of the Criminal Justice System and an analysis of its structure and function. This course required of all CJ majors and is a prerequisite for all other courses in criminal justice. Credits: 3 (3.0)

44.111 INTRODUCTION TO INDUSTRIAL SECURITY

An introduction to the planning, organization, and management of industrial, business, and government security resources. The focuses are on the protection of assets via the integration of physical, personal, and information security. Relations between security organizations and government agencies are also explored. Credits: 3 (3.0)

44.115 INTRODUCTION TO HOMELAND SECURITY

This course will encompass the study and relationship between those entities and institutions necessary for the protection of the United States. Course instructional material will examine the components of Federal, State and Local Police Agencies, as well as the role of Private Security and Emergency Responders needed to facilitate the implementation of the Homeland Security Act. Particular attention will be focused on Policy, Plans and Procedures at governmental and community levels. Credits: 3 (0.0)

44.141 POLICE PROCESS

Examination of the historical development of police work with special emphasis on the conflicting role expectations facing the police officer. Credits: 3 (3.0)

44.201 COMPUTER APPLICATIONS IN CRIMINAL JUSTICE

Provides the student with an introduction to the use and application of computers and computer programs in word processing, data processing, and spreadsheet applications as they pertain to the field of criminal justice. By the end of the course, students will be able to utilize all three applications. Prerequisite(s): 44.101. Credits: 3 (3.0)

44.203 CRIMINAL JUSTICE TECHNOLOGY AND INFORMATION SYSTEMS

This course is designed to introduce students to the latest innovations in the applications of new technological advances in the criminal justice system. Topic areas include an examination of the new technology of crime commission, and the corresponding new technology of crime control strategies. Our focus will be on the application of both "hard" technology (e.g. equipment, hardware, devices, etc.) and "soft" technology (e.g. computer software programs, information systems, classification devices, and other problem-solving applications) in each of the following areas: crime prevention, police, courts, institutional corrections, community corrections and the private sector. Credits: 3 (0.0)

44.212 WEAPONS OF MASS DESTRUCTION

This course will center on Weapons of Mass Destruction (WMD) and their potential use by terrorists to obtain their goals. We will explore the origins, development and weaponization of Chemical, Biological, Nuclear and Radiological Systems and Devices. The course content is designed particularly for the First Responder to such incidents of WMD. The class will focus on the preparation and execution of plans and policies to counter this threat. Credits: 3 (0.0)

44.221 CRIMINOLOGY I

The definition and nature of crime, criminal statistics, and theories of crime causation are included. Required of all CJ majors. Credits: 3 (3.0)

44.233 CRIMINAL PROCEDURE

Examines the rules that govern the everyday operation of the criminal justice system from investigation to sentencing and appeal. Topics include: Investigation, arrest, search and seizure, interrogation, pretrial detention and hearings, plea bargaining, trial procedures, sentencing, and appeals. Prerequisite(s): 44.101. Credits: 3 (3.0)

44.234 CRIMINAL LAW

The historical origins and development of criminal law from the early common law to contemporary decisions and statutes. Constitutional and statutory factors as they pertain to criminal responsibility, capacity, crimes against persons and property, defenses to criminal charges and sentences. Sections of the Massachusetts Criminal Code and other statutes will be covered where applicable. Credits: 3 (3.0)

44.235 INTRODUCTION TO THE LAW AND POLITICS OF CONSTITUTIONAL DEVELOPMENT

A course examining American constitutional doctrine as it has developed historically through the process of constitutional adjudication. Credits: 3 (3.0)

44.241 PHYSICAL SECURITY

The basic principles of physical security with emphasis on tailoring these principles to the protection of specific operations and facilities. Proper planning, appropriate design, and use of modern techniques and devices to enhance security while reducing costs are discussed. Credits: 3 (3.0)

44.248 TERRORISM

This course is acquaints the Criminal Justice student with the concept of terrorism at both the international and domestic levels. Topics include the history of terrorism, terrorism today and terrorism in the future. Counter measures taken to respond to terrorist threats are also examined. Credits: 3 (3.0)

44.251 INSTITUTIONAL CORRECTIONS

Detailed examination of the U.S. prison and jail systems, highlighting such topics as classification of offenders, crowding, treatment programs, prison violence, and privatization. Credits: 3 (3.0)

44.261 JUVENILE DELINQUENCY

An examination of causative factors in the development of youthful offenders and the development and philosophy behind treatment and rehabilitative practices. Credits: 3 (3.0)

44.281 CRIMINAL JUSTICE ETHICS

This course provides an overview of issues pertaining to criminal justice ethics, including police, judicial and correctional ethics as well as issues in legislative ethics relating to the development of criminal justice policy. Credits: 3 (0.0)

44.312 SECURITY MANAGEMENT

Addresses the basic interdisciplinary principles of security management including planning, budgeting, organizing, staffing, directing, and controlling. This course will also cover marketing security services to management, risk management, civil and criminal liability, and labor relations. Each aspect of the course is designed to prepare security managers to face the new challenges as broader and more cost-effective protection is required with fewer resources. The course will also bring about greater awareness and understanding of the various options available in security and loss control. It will identify a number of risk areas and outline various deterrent and preventative methods. Credits: 3 (3.0)

44.342 CRIMINAL PROFILING

Overview of the development and character of the many types of offenders who become criminal psychopaths. The study of offender profiling is a method of identifying the perpetrator of a crime based on an analysis of the nature of the offense and the manner in which it was committed. We will explore the various methods used in classifying and predicting criminal behavior derived from the field of Criminology, Psychology and Forensic Science. Credits: 3 (3.0)

44.343 FORENSIC PSYCHOLOGY

The application of psychological theories, principles, and research to issues of concern to the criminal justice system. Credits: 3 (0.0)

44.347 COMMUNITY POLICING

An examination of community policing models, application, issues, and contemporary research on community policing. Prerequisite(s): 44.101 or permission of instructor. Credits: 3 (3.0)

44.351 COMMUNITY BASED CORRECTIONS

A comprehensive review of community-based sanctions and community-based, early-release mechanisms. In addition to traditional probation and parole reviews, "new" intermediate sanctions such as electronic monitoring, intensive supervision, boot camps, day fines, day reporting centers, and community service sentences. Credits: 3 (3.0)

44.360 GENDER, RACE AND CRIME

The gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners. Prerequisite(s): 44.234, 46.345, or 46.347. Credits: 3 (3.0)

44.365 HATE CRIMES

Hate crimes illustrate bigotry plus criminal acts. This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category. This is a rich and comprehensive exploration that begins with understanding the psychology of prejudice and ends with reviewing genocide as a mass hate crime. Prerequisite(s): 44.101 or instructor permission. Credits: 3 (3.0)

44.370 CRIMINAL JUSTICE MANAGEMENT

An introduction to the principles of administration, including planning, budgeting, grantsmanship, and evaluation as they relate to the criminal justice manager. Prerequisite(s): 44.101. Credits: 3 (3.0)

44.373 ISSUES IN POLICE ADMINISTRATION

Specific analysis of the management of contemporary police forces, including staffing, scheduling, training, collective bargaining, community relations, and other related issues. Prerequisite(s): 44.101. Credits: 3 (3.0)

44.380 SELECTED TOPICS IN CRIMINAL JUSTICE

An advanced course of study and examination of a variety of current issues and topics in criminal justice. Students without a sufficient background in criminal justice courses should not attempt this course. Subject matter to be announced in advance. Visit the current semester schedule on the Continuing Studies website for more details. Credits: 3 (3.0)

44.381 ETHICS IN CRIMINAL JUSTICE

This class provides an ongoing review of current ethical dilemmas facing law enforcement and public officials on a local, state, and federal level. Credits: 3 (3.0)

44.382 PRIVATIZATION OF CRIMINAL JUSTICE

This course examines the rationales, the characteristics, and the effects of the privatization movement in criminal justice. Particular emphasis is placed on privatization of police and prisons. Credits: 3 (3.0)

44.385 CRIME AND MENTAL ILLNESS

A consideration of the realities and myths surrounding the involvement of individuals with mental illness in the criminal justice system. Material from criminal justice and psychology will be examined, with emphasis on service models that foster collaboration between mental health professionals, law enforcement, the courts, and corrections. Credits: 3 (0.0)

44.390 INTRODUCTION TO CRIMINAL JUSTICE RESEARCH

An introduction to research methods for the criminal justice professional including terminology, standard methodologies, and elementary statistics. Credits: 3 (3.0)

44.395 STATISTICS IN CRIMINAL JUSTICE

This course is an extension of concepts learned in 44.390 (Introduction to Criminal Justice Research Methods). Statistics will be utilized as a mathematical language for interpreting the interrelation of social forces impacting criminality and deviance. The course will focus on how various statistics are calculated, but more importantly, the meaning of these figures for criminal justice scholars and practitioners will be discussed. Prerequisite(s): 44.390 Credits: 3 (3.0)

44.397 CRIME MAPPING

This course examines the use of new technologies to analyze crime patterns and develop crime prevention strategies. Students study theories that explain the geographic distribution of crime and learn how to use Geographic Information Systems to study crime in ways that draw upon theory as well as how to apply GIS techniques in the law enforcement and corrections fields. Prerequisite(s): 44.390 Credits: 3 (3.0)

44.398 METHODS OF DATA ANALYSIS

The student is introduced to computer software packages (i.e. SPSS) used to analyze large quantitative data sets common in criminal justice/criminology. This course is seen as the capstone to the research methods/technology component of the major, and is intended for upper level students, especially those preparing for graduate study. Prerequisite(s): 44.390 Credits: 3 (3.0)

44.401 SUBSTANCE ABUSE AND CRIME

Covers the problems posed by substance use/abuse and examines the role and impact of the legal, criminal justice, and public health systems, as well as current treatment/intervention approaches. Prerequisite(s): 44.101 or instructor permission. Credits: 3 (3.0)

44.422 VICTIMOLOGY

Examines the patterns of victimization, the characteristics and lifestyles of crime victims, and the impact of their victimizations. The treatment of victims by the criminal justice system will be examined along with possible reforms in these approaches. Prerequisite(s): 44.101 or instructor permission Credits: 3 (3.0)

44.478 CHILD MALTREATMENT

Course is concerned with introducing students to empirical findings and theoretical perspectives concerned with the maltreatment of children and youth. One of the major goals of the course is to balance the view of children and youth in the criminal justice system by focusing on their victimization instead of exclusively on their offending behavior. Credits: 3 (3.0)

44.496 CRIMINAL JUSTICE PRACTICUM

Assigned fieldwork under the supervision and with the permission of the instructor assigned to the course. The purpose is to broaden the educational experience of pre-service students in law enforcement, probation, and correctional agencies within this area. This course is designed to provide a correlation of theoretical knowledge with practical experience in an area of particular interest to the student. Prerequisite(s): Instructor permission. Credits: 3 (3.0)

45.201 INTRODUCTION TO PHILOSOPHY

Examines some of the typical approaches to philosophical questioning and the issues raised in such inquiry: what is true knowledge, what is reality, what is the good, what is the right political order, what is the nature of religious faith? Credits: 3 (3.0)

45.202 INTRODUCTION TO LOGIC AND CRITICAL REASONING

Studies the methods used to distinguish correct from incorrect reasoning. This course will aim at developing (1) an ability to express one's ideas clearly and concisely; (2) an increased skill in defining one's terms; and(3) a capacity to formulate arguments vigorously and to scrutinize them critically. Credits: 3 (3.0)

45.203 INTRODUCTION TO ETHICS

Examines the basic issues and problems of ethics and values and a survey of some important alternative answers to the questions raised, on both an individual and a social level, by our necessity to act and to live in a rational and human way. Credits: 3 (3.0)

46.101 INTRODUCTION TO AMERICAN POLITICS

An introduction to the politics, structure, and behavior of the American National Political Community. Credits: 3 (3.0)

46.110 INTRODUCTION TO POLITICS

An introductory exploration of basic political concepts, ideologies, and themes. Stresses the importance of understanding politics for everyday life. Credits: 3 (3.0)

46.112 INTRODUCTION TO COMPARATIVE POLITICAL SYSTEMS

A cross-cultural analysis of various governmental systems; elements common to all forms of government are emphasized and variations among contemporary political systems are discussed. Balance between developed and Third World countries. Credits: 3 (3.0)

46.121 INTRODUCTION TO INTERNATIONAL RELATIONS

Surveys some recent methods and approaches used in the study of international politics and provides an introduction to current problems of foreign policies of major world powers. Credits: 3 (3.0)

46.210 MEDIA & POLITICS

This course addresses the role of the media in American politics and the role of politics in the American media. We will begin with a survey of general readings on the historical development of mass communications and the transformation of the media in the Information Age. Then we will focus on ways in which the telegraph, telephone, radio, television, and the Internet changed the political landscape. Next, we examine how the right to privacy evolved in response to the rise of investigative journalism. Finally, by studying a few major stories in depth, we will try to gain a better understanding of the factors involved in the conversion of events and developments into seemingly significant news. Credits: 3 (3.0)

46.220 INTRODUCTION TO GENDER STUDIES

Provides a broad introduction to the way feminist approaches to politics and political theory have transformed our understanding of political life. Topics include the historical exclusion of women from political activities and institutions, the evolution of the modern women's movement, the rise and fall of the nuclear family, the persistence of discrimination based on sexual orientation, and the political economy of gender inequality. Prerequisite(s): BS. Credits: 3 (3.0)

46.230 LAW AND THE LEGAL SYSTEM

Presents an introduction to the nature of the legal process and the operation of the American legal system. Also discusses considerations of its political and social functions. Prerequisite(s): BS. Credits: 3 (3.0)

46.235 INTRODUCTION TO THE LAW AND POLITICS OF CONSTITUTIONAL DEVELOPMENT

An introductory study of constitutional law and politics; analysis of constitutional doctrine and the American constitutional system, with emphasis on contemporary controversies. Prerequisite(s): BS, CJ collateral. Credits: 3 (3.0)

46.253 INTRODUCTION TO PUBLIC ADMINISTRATION AND POLICY

An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered. Credits: 3 (3.0)

46.316 POLITICS AND FILM

Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world. Credits: 3 (3.0)

46.317 POLITICS AND MUSIC

A study of the transformative power of music through live musical performance. Analyzes several musical genres and places them in their broader historical context. Credits: 3 (3.0)

46.318 POLITICS & ADVERTISING

Examines the role political advertising plays in influencing public opinion, political agenda setting and voting behavior in contemporary politics. Topics include: Overview of modern presidential campaigns; Propaganda, political symbolism and media literacy;

Paid Advertising vs. free advertising, public relations and the emerging role of Special Interest Groups; Political rhetoric: "Framing, New Speak, and Spinning a Message"; Objective vs. partisan coverage of events and its effects on political decisions, public opinion and voter's attitudes; Polling, and strategic/tactical decision making; Candidate selection, development, and packaging; Role, definition and types of emerging media in voting behavior. Credits: 3 (0.0)

46.327 THE DYNAMICS OF SEXUAL POLITICS

Starting with the constructionist approach of analyzing the sexual dynamics of ancient civilizations, we will expose how sex has been used as a political tool to further the cause of unrelated agendas, how attitudes about sex have changed from Greco-Roman times to the 1960's sexual revolution, culminating in the current political debate about Vermont's civil union laws. Join us in this academic endeavor to understand our roles as sexual beings both in history and in politics, as well as an exploration of our own attitudes towards differing sexualities. Credits: 3 (3.0)

46.348 LITERATURE, POLITICS AND GENOCIDE IN CAMBODIA

This course will examine various literary and political responses to the Cambodian genocide, particularly personal accounts or literary testimony by survivors and government sanctioned legal proceedings. The course will consider how the literary and political responses to the Cambodian genocide have at different times paralleled, complimented and opposed each other. The course will also ask whether their overall effect contributes to or detracts from the serving of justice and the process of healing for the survivors. To pursue these questions, we will read selections from novels and poetry written by Cambodian survivors side by side with accounts of political activities of the Cambodian government and the international community to bring the perpetrators of the genocide to justice. Credits: 3 (3.0)

46.350 URBAN POLITICS AND POLICY

A study of political power in, and the political structures of urban areas and the major issues and conflicts currently confronting them. Credits: 3 (3.0)

46.353 PUBLIC POLICY AND ADMINISTRATION

An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered. Credits: 3 (3.0)

46.368 MIDDLE EASTERN POLITICS

Utilizes an appreciation of Middle Eastern attitudes and values in developing insight into the tensions within the Middle East and between the Middle East and the western world. Credits: 3 (3.0)

46.380 AMERICAN FOREIGN POLICY

A study of the processes of American foreign policy in the contemporary world. Credits: 3 (3.0)

46.417 ANALYZE PEACE, VIOLENCE AND WAR

This course examines the political, social, and economic factors that cause violence and war, together with the possibilities for peaceful citizen action and constructive solutions to violence and conflicts. Different arenas of conflict are discussed, ranging from workplaces, families and communities, to nations, to the world. Credits: 3 (0.0)

46.422 SEMINAR: MEDIA STUDIES

This course explores some of the ways in which the development of digital communications has transformed American politics, journalism, education, commerce, and law. Topics include the expanding role of the Internet in political organizing and fundraising, the increasing power of blogs in reporting and analyzing news, the growth of online programs in higher education, the proliferation of web-based advertising, and the shifting boundaries between public and private in the digital age. Although there are no prerequisites for this course, students will be expected to exhibit advanced writing skills in weekly assignments and research projects. Students with sufficient technical skills will be permitted to submit blog entries and web pages rather than traditional term papers, but these projects will be graded according to students' ability to convey accurate information in college-level prose. While students do not need any special expertise in order to earn high marks, those who are not prepared to write advanced compositions are strongly advised to steer clear of this course. All of the course materials, which will include audio and video clips, will be delivered online. No textbook is required. Credits: 3 (0.0)

47.101 GENERAL PSYCHOLOGY

Intended as an introductory course both for non-concentrator and for concentrator, this course surveys the major areas of psychology: the nature of psychology as a science, principles of learning, the relationship between physiological and psychological processes in humans and animals, sensation and perception, cognitive processes, motivation and emotion, personality and development, adjustment and behavior disorders, and social behavior. Credits: 3 (3.0)

47.209 SOCIAL PSYCHOLOGY

Presents an introduction to the study of social behavior in interpersonal relationships, groups, organizations, and the community: Diversity in regard to groups of peoples, cultures, and views is emphasized. Topics include non-verbal communication, social attraction, attitudes and attitude change, group dynamics, prejudice, labeling, stereotyping, interpersonal influence, and applications to social problems.. Prerequisite(s): Corequisite: 47.101. Credits: 3 (3.0)

47.232 PSYCHOLOGY OF PERSONALITY

Serves as an introduction to the study of human personality including such topics as self- concept, anxiety and adjustment, and achievement motivation. Psychoanalytic, humanistic, cognitive, and behavioral theories of personality are stressed with consideration of the interplay between theory and research. Prerequisite(s): Corequisite: 47.101. Credits: 3 (3.0)

47.255 COMMUNITY PSYCHOLOGY

Surveys the nature and practice of community psychology, including principles of community organization and change as seen in such areas as education, mental health, the workplace, health care, justice system, corrections and social services. Students may partici-

pate in field research or practice under the direction of an assigned agency, and classroom work will include discussion of the field experiences of the participants. Prerequisite(s): Corequisite: 47.101. Credits: 3 (3.0)

47.260 CHILD AND ADOLESCENT DEVELOPMENT

The study of childhood and adolescence. The course begins with an overview of major theoretical perspectives, research methods, and ethical issues in human development. Based on a chronological approach, the course covers prenatal development and birth, infancy, childhood and adolescence, and the transition to adulthood. Prerequisite(s): Corequisite: 47.101. Credits: 3 (3.0)

47.269 RESEARCH I: BASICS

An introductory course concentrating on the basics of scientific research in Psychology. Students will learn: how to acquire information from libraries and the internet; methods for collecting data, such as surveys, case studies, unobtrusive measures and observational procedures, in experimental, quasi-experimental and correlational designs; how to operationalize variables to create reliable and valid measures; to identify types of data and how to describe and graph data; the basics of hypothesis testing and statistical significance; how research is communicated in research reports using APA style. Attention will also be given to ethical issues in research with human and nonhuman subjects. Students must earn a grade of C or better in this course. Prerequisite(s): 47.101 or its equivalent. Credits: 3 (3.0)

47.272 ABNORMAL PSYCHOLOGY

Presents an introduction to the study of various patterns of mental, behavioral, and personality disorders with consideration of issues of diagnosis, etiology, and treatment in terms of contemporary theory, research, and practice. Prerequisite(s): 47.101. Credits: 3 (3.0)

47.273 BRAIN, MIND & BEHAVIOR

(Course number formerly 47.373)
Surveys issues and topics dealing with the physiological and evolutionary bases of behavior. Biological systems and processes that influence behavior are considered, with particular emphasis on brain mechanisms. Recent discoveries in the neurosciences will be presented. Methods of research are reviewed. Prerequisite(s): Corequisite: 47.101. Credits: 3 (3.0)

47.276 THEORIES OF LEARNING

Traces the development of theories of learning from earlier global theories to more recent and more specific ones. Behavioral, cognitive, and physiological approaches are compared. Current issues of importance in the study of learning also are stressed. Prerequisite(s): 47.101. Credits: 3 (3.0)

47.277 SENSATION AND PERCEPTION

The course focuses on human sensations and perceptions. Students will examine how people know the objects and events of the world through hearing, seeing, smelling, tasting, moving, and touching. Students will also examine the foundations of experiences which correspond to independent measures of the world (veridical) and those which do not (illusory). Prerequisite(s): 47.101 Credits: 3 (3.0)

47.312 LEARNING AND BEHAVIOR

Examines various methods and techniques suitable for the modification of human behavior, based on the principles and findings of experimental studies of animal and human behavior. Considers how such methods can be used in education, mental health and corrections, and self-directed personal change.
Prerequisite(s): 47.101. Credits: 3 (3.0)

47.328 DYNAMICS OF INTERPERSONAL RELATIONS

Presents an analysis of psychological dynamics in interpersonal behavior, emphasizing such topics as interpersonal communication, self-disclosure, personal styles of interaction and techniques of change. The primary focus is on the behavior of the students themselves. Prerequisite(s): Corequisite: 47.101. Credits: 3 (3.0)

47.335 PSYCHOLOGY AND WOMEN

Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women's status. Prerequisite(s): 47.101. Credits: 3 (3.0)

47.351 HUMAN SEXUALITY

Addresses the biological, psychosocial, and attitudinal aspects of human sexuality through lectures, discussions, films from a variety of perspectives.
Prerequisite(s): 47.101. Credits: 3 (3.0)

47.355 SPORT AND EXERCISE PSYCHOLOGY

The course will cover topics such as motivation, arousal and anxiety in performance, performance enhancement, youth sport and family interactions, leadership, cooperation and competition, team cohesion, gender issues, exercise and mental health, and psychological factors in injury prevention and rehabilitation. Prerequisite(s): 47.101 and Level Junior Standing. Credits: 3 (3.0)

47.360 ADULT DEVELOPMENT AND AGING

Begins with an overview of recent theoretical perspectives on adult development and aging. In chronological sequence, it presents the stages of adulthood and concludes with death and dying. Topics covered include personal, family, and vocational development through adulthood, gender pattern differences, and the impact of changing demographics, including the lengthening of the life span. Prerequisite(s): 47.101, and 47.260 or comparable knowledge. Credits: 3 (3.0)

47.361 DEVELOPMENTAL PSYCHOPATHOLOGY

Examines specific disorders occurring during childhood and adolescence, including neurotic disorders, autism and psychoses, retardation and learning disabilities, and conduct disorders. Consideration also will be given to developing an understanding of how parent/child interactions may impair healthy development (e.g., child abuse, neglect, parental alcohol and substance abuse). Prerequisite(s): 47.101, 47.260. Credits: 3 (3.0)

47.363 INTRODUCTION TO DISABILITIES STUDIES

Presents information about developmental and other disabilities with a focus on mental retardation. Looks at current practices in providing service to people with mental retardation and their families. Prerequisite(s): 47.101. Credits: 3 (3.0)

47.369 RESEARCH II: STATISTICS

An intermediate level course, required of all psychology majors, focusing on computational statistics and their interpretation. Student will: review types of data and how they are descriptively measured; test hypothesis using t-tests and ANOVA for difference within and between groups, compute measures of correlation; learn the assumptions of parametric tests and how to apply nonparametric analyses; communicate, graph and interpret statistical results using APA format. Students will also be introduced to statistical packages on the computer. Prerequisite(s): 47.101, and 47.269 (with grade of "C" or better). Credits: 3 (3.0)

47.375 RESEARCH III: LABORATORY

An advanced course, capping the sequence that began with 47.269 and continued with 47.369, in which students will design and carry out one or more empirical research projects from start to finish, resulting in a complete research report using APA style and in an oral poster session presentation. The range of possible research topics will vary, reflecting the interests of the instructor. Students will perform literature reviews; formulate a research question; operationalize variables; develop research designs; obtain ethical review and approval; and collect and analyze data. Prerequisite(s): 47.269 (with grade of "C" or better), and 47.369. Credits: 3 (3.0)

47.472 SEMINAR: PERSONALITY

Focuses on a variety of theoretical conceptualizations of the productive personality, psychodiagnostic tools and techniques and case histories. Students develop and enhance their professional skills with respect to presentation of self, writing, and psychological diagnostic techniques. Prerequisite(s): 47.101 and 47.269. Credits: 3 (0.0)

47.475 SEMINAR IN CLINICAL PSYCHOLOGY

Focuses on such topics as: the nature of psychotherapy and clinical practice; analysis of specific clinical theories of psychopathology and psychotherapy (family systems, transactional analysis, Gestalt, behavioral, psychoanalysis); the nature and causes of specific psychological disorders (schizophrenia, affective disorders, etc.); the nature of mental hospitals; the community mental health movement; clinical methods of assessment; and current topics in personality theory and research; etc. Prerequisite(s): 47.232 or 47.272 or related experience. Credits: 3 (3.0)

47.477 SEMINAR: CONTEMPORARY TRENDS

Will be offered from time to time, and deals with issues in contemporary areas of psychological practice and/or research; implications for future developments in the field will be covered. Prerequisite(s): 47.101. Other prerequisites may be specified by the instructor. Credits: 3 (3.0)

48.101 INTRODUCTION TO SOCIOLOGY

Serves as the basic course in sociology. Emphasis is directed at the ways in which social institutions such as government, schools, the economy, social class, and the family develop and influence our lives. It is concerned not only with presenting various ways to understand our relationship to society but also with ways to change it. Credits: 3 (3.0)

48.110 INTRODUCTION TO SOCIAL VALUES

A sociological analysis of belief systems in contemporary United States. The different perspectives held by social groups are shown, and students are encouraged to examine their own perspectives. The role of churches, governments and families in conserving and changing the social structures of modern society are examined. Beliefs are related to political and economic interests and conflicts. Historical and international comparisons are made. Credits: 3 (3.0)

48.111 A NOVEL APPROACH TO SOCIOLOGY

Examines major sociological themes through analysis of literature, primarily major works of fiction. Credits: 3 (0.0)

48.216 SOCIOLOGY OF WAR AND PEACE

The purpose of this course is to examine critically the social forces that contribute to war, war's social consequences, and the possibilities for creating a more peaceful world. Credits: 3 (0.0)

48.220 SELF-ASSESSMENT AND CAREER DEVELOPMENT

Studies the meaning of work in our society. Class participants will assess their own life experiences and develop plans to integrate interests, values, and abilities into meaningful and realistic life/work options. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.231 SOCIOLOGY OF THE FAMILY

Studies the nature of the family in contemporary society, with particular emphasis on the family in America. What functions does the family perform in modern society? How is it changing? How do these changes affect our lives? Prerequisite(s): 48.101. Credits: 3 (3.0)

48.234 THE STUDY OF MINORITIES

Examines the process of immigration and majority-minority relations in the United States over the last century with particular emphasis on the process of adaptation in a pluralistic society. The treatment of minority groups in other societies is examined as well. Credits: 3 (3.0)

48.250 SOCIOLOGY OF NON-VIOLENCE

An analysis of non-violent efforts to achieve social change through demonstrations, civil disobedience, etc. Movements led by Mahatma Gandhi, Martin Luther King, Jr., and others are examined. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.255 SOCIOLOGY OF DEVIANCE

Analysis of how social institutions define and respond to various forms of social deviance, from individual mental illness to gang violence to illegal acts by governments and corporations. Attention will be paid to

the construction and management of deviant identities, the role played by social status, and the social importance of institutions of social control. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.260 SOCIOLOGY OF MASS MEDIA

Investigates the structure of mass communications and the impact of the media on our lives. A full range of media are considered, including television, radio, cinema, and the press. The potential impact of new media sources such as cable TV are also considered. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.276 SOCIOLOGY OF THE GUN

This course examines the social impact of guns on the American psyche, from deer hunters and intergenerational family bonds to street gangs and broken families, from collectors and recreational users to hospital trauma. Self-defense issues are discussed within the context of the Second Amendment. The conflict between pro-gun and anti-gun special interest groups and the evolution of an American gun culture will be studied. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.305 SOCIOLOGY OF FAMILY LAW

Examines some social issues in family law, the changes therein, and the social climate and consequences accompanying these. By using the sociological method of inquiry to examine family law cases, the relationship between law and society as instruments of order and change are exemplified. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.317 SOCIOLOGY OF GENOCIDE

The deliberate destruction of an ethnic group is an historical event and a social process. This course addresses such questions as: Why do genocides occur? Why do people become genocide perpetrators? How do genocides affect survivors and their offspring? How can genocide be prevented? Focus is on Native American, Armenian and Jewish experiences and recent cases of ethnic cleansing. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.319 THE SOCIOLOGY OF THE SIXTIES

Course covers the following: The Sociology of American Radicalism, The 50s and McCarthyism; The Beats and the Hip world of Kerouac and Allen Ginsberg; The Vietnam War; SDS; Black Power; Women's rights; Gay Power; The Cultural Revolution of the Beatles, The Stones, The Doors, The Who; Rhythm and Blues; Surfers, Bikers, Perky Girls; The Right Wing Reaction and What It All Means Today. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.321 SOCIAL THEORY I

Examines major sociological theories, both historic and contemporary. Students learn how theory is created, and how it is linked to facts. Prerequisites: 48.101, plus one other sociology course. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.340 SOCIOLOGY OF SPORTS

Examines the history of modern sports at the amateur and professional levels and international competition. The impact of race, sex, economics, and politics on the institution of sports will also be examined. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.345 URBAN SOCIOLOGY

Deals with issues related to the quality of life in American cities. Students taking this course may engage in research projects on the city of Lowell and the role of the University of Massachusetts Lowell within that city. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.351 THE SOCIOLOGY OF HEALTH AND HEALTH CARE

Presents a historical and contemporary study of the sociopolitics of health, illness, and the health care industry in the United States. Attention is given to providers, consumers, owners, workers, and professionals in terms of their power, class, race, sex, and age. Reforms and alternatives are considered. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.361 SOCIOLOGY OF LAW

The course examines the role of social forces in defining the law. Topics include the legal profession, white-collar crime, and the importance of race, class and gender in the criminal justice system. Prerequisite(s): 48.101. Credits: 3 (3.0)

48.382 SOCIAL MOVEMENTS

Considers organized action undertaken to alter the social position of a group. Organization, techniques of action, motivation of participants, and group ideologies are studied. Materials from historical, social, psychological, and sociological sources are used. Prerequisite(s): 48.101. Credits: 3 (3.0)

49.201 ECONOMICS I (MICROECONOMICS)

Studies the principles of production and exchange. An introduction to demand, supply, pricing, and output under alternative market structures. Derived demand and resource markets are introduced. Prerequisite(s): 90.111. Credits: 3 (3.0)

49.202 ECONOMICS II (MACROECONOMICS)

Studies the principles governing the level of national income and employment. Also examines the commercial banking system, monetary and fiscal policy, the international economy, and alternative economic systems. Prerequisite(s): P: 90.111. Credits: 3 (3.0)

49.211 STATISTICS FOR BUSINESS AND ECONOMICS I

Presents descriptive statistics, sophisticated counting techniques and other components of probability, simple random variables and their distribution, bivariate functions, sampling theory properties of estimators. Prerequisite(s): 92.122 or equivalent. Credits: 3 (3.0)

49.212 STATISTICS FOR BUSINESS AND ECONOMICS II

Discusses interval estimation, hypothesis testing, analysis of variance, applied regression theory, correlation analysis, and other selected topics. Prerequisite(s): 49.211. Credits: 3 (3.0)

49.325 UNITED STATES ECONOMIC HISTORY

The evolution of institutions and their functions, and sources of economic development. The contributions of railroads, agricultural population growth, immigration, capital formation and technological progress to economic development. Other areas addressed: rapid industrialization and antitrust laws; evolution of financial institutions, the creation of the Federal Reserve System, crash of 1929, the depression of the 1930s, the New Deal and various banking acts, the labor movement, the growth of international trade. Credits: 3 (3.0)

50.211 INTERMEDIATE FRENCH I AND CULTURE

Reviews basic grammatical structures and idiomatic patterns with emphasis upon increased proficiency in oral expression and aural comprehension. This course is intended for students who have completed two to three years of high school French, preferably during their junior and senior years, or for students who have completed 50.102; French II and Culture. Prerequisite(s): 50.102. Credits: 3 (3.0)

50.212 INTERMEDIATE FRENCH II AND CULTURE

A continuation of 50.211; Intermediate French I and Culture, which is a prerequisite, with emphasis on continued development of comprehension and conversational skills. Prerequisite(s): 50.211. Credits: 3 (3.0)

50.320 CONTEMPORARY FRENCH CIVILIZATION AND CULTURE

In this course we look closely at some fundamental issues reflecting the rapidly changing parameters of French culture and society today; the question of national identity and cultural hybridite, the relationship between the evolving types of family relations and new forms of social and political contracts; the crucial personal problems faced by the young, the poor, the immigrant and the elderly in an increasingly multicultural Hexagone attempting to define its place, role and function within the recently defined Europe unit and the new global world order; the current status of women; the relationship between cities and ghettos, violence and crime; the nature of emerging forms of cultural production within new trends and styles of modernite. Prerequisite(s): 50.212. Credits: 3 (3.0)

50.375 GENDER AND SEXUALITY IN FRENCH CINEMA

An examination of the relationship between gender roles and identities in contemporary French cinema from several perspectives: stardom, film and ideology, gender and genre, film and sexuality. Special Notes: Conducted in English. AH&D. Credits: 3 (0.0)

50.376 FRENCH CINEMA & SOCIETY

Covers the dramatic presentation French society gives of itself during the period of profound social and economic change, from the New Wave and the May 68 events to today's younger generation facing an uncertain tomorrow. Each screening (in French with subtitles) is preceded by an introduction placing the film in its historical context. Conducted in English. Credits: 3 (3.0)

50.378 WOMEN IN FRENCH CINEMA

Focuses on the way French film makers (male, and more recently female) have been portraying women in their films. Carefully selected French films with English subtitles are used to show the evolution that has taken place from Carne and Renoir's poetic realism to the present. Selected readings are also used to underscore various themes, such as how women have been represented in these films. Conducted in English. Credits: 3 (3.0)

52.325 ITALIAN AMERICAN LITERATURE AND CULTURE

Discusses the most prominent authors and works of Italian-American Literature as they, by using the ethnic setting, are able to convey universal human concerns and themes. The discussion on Italian-American ethnic issues will include such films as The Godfather, Moonstruck, The Sicilian, Goodfellas, and The Untouchables. Conducted in English. Credits: 3 (3.0)

52.335 CINEMA AND ITALIAN AMERICANS

A course looking at the ways in which film addresses issues of ethnicity and its representation in the multi-ethnic and multi-cultural memory of American life. This will be an interdisciplinary course focusing on the relentless portrayal in the the news and entertainment industries of Italian Americans. It will shed light on the contributions of this ethnic group by analyzing the negative and positive stereotypes through films. Conducted in English. Credits: 3 (3.0)

52.374 CLASSICS OF ITALIAN CINEMA

This course, through a series of classic Italian films internationally recognized, will present how the style is not only something which comes from within the director reflecting that most intriguing of all subjects, he personality of the director, but also the film's influence upon American productions. Credits: 3 (3.0)

52.378 ITALIAN CINEMA AND CULTURE

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in English. Credits: 3 (3.0)

52.380 ITALIAN CINEMA: DIRECTORS AND THEMES

A study of Italian film history and its accomplishment by exploring the relationship of cinema to sociopolitical, economic, cultural, and literary events. The course will discuss in depth either a) one or two major and well known directors; b) a major thematic and stylistic division in a century of cinematic creativity. Credits: 3 (3.0)

53.105 CHINESE I AND CULTURE

An introductory course intended for students with little or no knowledge of the language. Its aim is to present essential vocabulary and grammar, and to develop the pronunciation, listening, reading, and writing skills necessary for basic communication and comprehension. Customs and cultural insights are also presented. **Beginning and intermediate language

courses must be elected for two consecutive semesters and in the prescribed sequence. College credit may not be granted for one semester of such courses unless exception is permitted by the Coordinator of modern languages on the basis of placement in a more advanced language course. Credits: 3 (3.0)

54.101 SPANISH I AND CULTURE

Development of fundamental skills in oral expressions and aural comprehension, reading and writing. Students who have had more than two to three years of Spanish at the high school level may not earn credit for this course. Credits: 3 (3.0)

54.102 SPANISH II AND CULTURE

Serves as a continuation of 54.101; Spanish I and Culture, which is a pre-requisite. Prerequisite(s): 54.101 or equivalent. Credits: 3 (3.0)

54.211 INTERMEDIATE SPANISH I AND CULTURE

Reviews Spanish grammar and syntax with emphasis upon increased proficiency in aural comprehension and oral expression. This course is intended for students who have completed two years of high school Spanish, preferably during their junior and senior years, or for students who have completed 54.102; Spanish II and Culture. Prerequisite(s): 54.102 or equivalent. Credits: 3 (3.0)

54.212 INTERMEDIATE SPANISH II AND CULTURE

A continuation of 54.211; Intermediate Spanish I and Culture, which is a prerequisite, with an emphasis upon continued comprehension and conversational skills. Prerequisite(s): 54.211 or equivalent. Credits: 3 (3.0)

54.221 READING AND CONVERSING IN SPANISH I

Emphasizes Spanish grammar review and the development of reading and conversational skills. Selected contemporary works provide the basis for developing conversational comprehension and conversational and composition skills. This course is intended for students with a solid foundation in the Spanish language which had been gained from at least three years of high school study immediately prior to admission to the University. Prerequisite(s): 54.102 or equivalent. Credits: 3 (3.0)

54.222 READING AND CONVERSING IN SPANISH II

Serves as a continuation of 54.221, which is a prerequisite, with emphasis upon continued development of reading and conversational skills. Prerequisite(s): 54.221 or equivalent. Credits: 3 (3.0)

54.234 ADVANCED SPANISH GRAMMAR AND SYNTAX

Studies complex grammatical and syntactical problems systematically. Reviews more advanced problems. Credits: 3 (3.0)

54.254 TOPICS IN CONVERSATIONAL SPANISH

Discussion of a wide spectrum of contemporary topics with the object of continuing to develop facility and accuracy of expression. Prerequisite(s): Advanced level proficiency. Credits: 3 (3.0)

54.301 INTRODUCTION TO SPANISH LITERATURE

Studies the history of Spain's literature in its general trends and through its major writers revealing the complicated series of interactions, conflict, and influences which have molded the unique character of the nation. Conducted in Spanish. Prerequisite(s): Permission of instructor. Credits: 3 (3.0)

54.302 INTRODUCTION TO LATIN AMERICAN LITERATURE

A study of the major writers of Latin America from the indigenist literature to the modernist period. The authors and their works are placed in their historical, sociological, and literary perspective, thus introducing students to the Latin American World. Conducted in Spanish. Prerequisite(s): permission of instructor. Credits: 3 (3.0)

54.315 LATIN AMERICAN CIVILIZATION AND CULTURE

Considers significant intellectual, artistic, historical, and sociopolitical aspects of Latin America from the beginning of its history. Through audiovisual aids and selected readings, the student will explore the Latin American way of being and expressing. Credits: 3 (3.0)

54.320 SPECIAL TOPICS IN SPANISH STUDIES

Focuses on a limited topic of special interest in culture, civilization, or literature. May be taught in English or in Spanish. Course content and approach will vary depending on instructor. Prerequisite(s): permission of instructor. Credits: 3 (3.0)

54.333 ADVANCED SPANISH GRAMMAR AND SYNTAX I

A systematic study of complex grammatical and syntactical structures in Spanish with extensive practice in writing. Required for Spanish Majors. Credits: 3 (3.0)

54.335 SPANISH WOMEN WRITERS IN TRANSLATION

A continuation of 54.330, Spanish Women Writers. Focus on specific authors and their contribution to Hispanic literature. Credits: 3 (0.0)

54.411 HISPANIC SHORT FICTION

Students will become familiarized with basic terminology for the analysis of narrative, and will practice analysis as they read short novels and stories by authors from different countries: Gabriel Garcia Marquez (Colombia), Jose Emilio Pacheco (Mexico), Rosario Ferre (Puerto Rico) and Miguel de Unamuno (Spain). In so doing, they will also learn more about diverse socio-historical contexts in the Hispanic world. Prerequisite(s): Conducted in English Credits: 3 (3.0)

57.475 COMMUNITY CONFLICT RESOLUTION

This course gives students an understanding of the main issues and solutions involved in community level conflict resolution; e.g., in neighborhoods, workplaces, and other institutions. It develops students' skills in practicing conflict resolution and/or evaluating programs in the field of dispute resolution.It is important to understand why conflict happens and how to resolve conflict. Credits: 3 (3.0)

58.101 ART APPRECIATION

The course introduces the student to the technical, aesthetic and historical aspects of architecture, sculpture, and painting. An analysis of the visual elements used in fine arts such as color, line, shape, texture, and principles of design are developed through slide lectures, museum visits and assigned readings. In addition, students investigate the purposes of art and visual communication and develop a heightened sense of critical thinking that allows them to investigate successfully different modes of representation, styles and media in a multicultural society. Credits: 3 (3.0)

58.203 HISTORY OF ART I: PREHISTORIC TO MEDIEVAL ART

A survey of the origins and development of painting, sculpture and architecture from prehistoric times to the Medieval period. Emphasis is placed on representative works of art from Ancient Egypt and Near East, Antiquity, Byzantine and Medieval, and Early Renaissance Europe. Methodological problems of interpretation, formal analysis and aesthetic principles are studies in these art works. Credits: 3 (3.0)

58.204 HISTORY OF ART II: RENAISSANCE TO MODERN ART

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts. Credits: 3 (3.0)

58.205 STUDIES IN WORLD ART

Historical and critical examination of regions works of art from China, Asia, India, Africa, North America, Latin America, and Mexico. Topics vary from year to year. Course may be repeated. Spring, alternate years. Credits: 3 (3.0)

58.211 NINETEENTH CENTURY ART

A study of the nineteenth century European painting, sculpture, and architecture are analyzed, including the art of Neoclassicism, Romanticism, Realism, Impressionism, Post-Impressionism, Symbolism and Art Nouveau. Credits: 3 (3.0)

58.221 TWENTIETH CENTURY ART

A study of American and European movements in painting, sculpture, and architecture from 1900 to the present. Emphasis is placed on Fauvism, Cubism, Expressionism, Surrealism, International Style, Pop, Op Art, Minimal Art, Photorealism, and Post-Modernism. Credits: 3 (3.0)

58.241 MEDIEVAL ART

A survey of architecture, sculpture and painting of Early Christian, Byzantine, Carolingian, Romanesque and Gothic periods from the fourth to the fourteen centuries in relationship to philosophical and socioeconomic developments. Emphasis on Hagia Sophia, Aachen Chapel, Saint Denis and the French cathedrals. Credits: 3 (3.0)

58.300 ART HISTORY, MUSIC AND CULTURE

This course studies the aesthetic, artistic and intellectual similarities between art history and culture in western and non-western civilizations. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts. Furthermore, this course surveys some of the fundamental aspects of art history and culture, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. See course 59.300. Credits: 3 (3.0)

58.313 AMERICAN ART

The study of American painting, sculpture, and architecture from the Colonial period to the end of the nineteenth century seen in relation to European developments and American social and technological changes. Emphasis is placed on New England architecture. Prerequisite(s): 58.101 and/or 58.211 or permission of instructor. Credits: 3 (3.0)

58.321 ITALIAN RENAISSANCE ART

A study of painting, sculpture, and architecture in Florence, Rome and .Venice during the fifteenth and sixteenth centuries. Special emphasis on the formation of the High Renaissance style and the role of representative artists of the period, such as Leonardo, Michelangelo and Raphael in Central Italy; Giorgione and Titian in Venice. Credits: 3 (3.0)

58.330 ITALIAN MANNERISM

A study on the impact of the High Renaissance in the sixteenth century, the subsequent development of early Mannerism in central Italy and the formation of the Proto-Baroque style in Venice and Northern Italy, the establishment of the courtly Mannerist style. The role of representative artists such as Anguissola, Pontormo, Rosso, Parmigianino, Bronzino, Beccafumi, Fontana, Vasari, Veronese, Bandinelli, Cellini, Palladio, Peruzzi and Ammanati is emphasized. Credits: 3 (3.0)

58.331 ASIAN ART

The purpose of this course is to provide a general overview of the art of the traditional cultures of Asia, China, India and Japan. This survey provides a critical and historical examination of these cultures. Credits: 3 (3.0)

58.340 WOMEN AND ART

Investigation of the various ways women have been portrayed in the visual arts from antiquity to the present. A chronological examination of selected female artists and their milieu from the Middle Ages to the twentieth century. Credits: 3 (3.0)

58.350 POST MODERNISM (CONTEMPORARY ART)

Following the Second World War, artists transformed the avant-garde tradition of their European predecessors to establish a dialogue with the mass media and

consumer culture that has resulted in a wide array of artistic movements. Issues ranging from multiculturalism and gender to modernism and postmodernism will be addressed through the movements of abstract expressionism, pop, minimalism, neo-expressionism and appropriate in the diverse media of video, performance and photography, as well as painting and sculpture. Credits: 3 (3.0)

58.370 ART HISTORY AND FILM

Examination of issues of content, theory and criticism in the traditional, modern and contemporary lives of artists; autobiographies, biographies and historiographies as source of filmic expression. Focus on the interpretation and transformation of art historical records into filmic vision as revealed in set and costume design, music, camera technique and other aesthetic elements of film, as well as how such elements function to extend and convey directorial vision to movements in art history. Prerequisite(s): 58.203 and 58.204 or permission of instructor. Credits: 3 (3.0)

58.494 DIRECTED STUDY IN ART HISTORY

An individual supervised research project relating to stylistic, thematic or methodological issues in Art History, the result to be presented in a significant paper. Prerequisite(s): Permission of Art History instructor. Credits: 1 (3.0)

58.496 PRACTICUM EXPERIENCE IN ART HISTORY

A program of on-campus and/or off-campus experiences for Art History students only. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural or artistic area and for applying techniques of problem solving and/or credits. Students will be graded satisfactory or unsatisfactory. Prerequisite(s): Permission of Art History Coordinator or supervising Art History instructor. Credits: 3 (3.0)

59.217 MEDIA, PERCEPTION AND CULTURE

This course explores the various means of media as an expression of popular culture. Students are encouraged to develop a habit of providing critical thought to what is read, seen or heard in the media. Credits: 3 (0.0)

59.221 TWENTIETH CENTURY ART

A study of American and European movements in painting, sculpture, and architecture from 1900 to the present. Emphasis is placed on Fauvism, Cubism, Expressionism, Surrealism, International Style, Pop, Op Art, Minimal Art, Photorealism, and Post-Modernism. Credits: 3 (0.0)

59.300 ART HISTORY, MUSIC & CULTURE

This course studies the aesthetic, artistic and intellectual similarities between art history and culture in western and non-western civilizations. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts. Furthermore, this course surveys some of the fundamental aspects of art history and culture, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. See course 58.300. Credits: 3 (0.0)

59.329 WOMEN IN TWENTIETH CENTURY MUSIC

The course traces the changes in attitude about the public participation of women in music during the course of the 205h century and investigates the music that women composed. Students learn basic concepts about music, allowing them to come to their own conclusions about the musical works. Interviews with women who compose or perform test the material presented in the course readings. Credits: 3 (3.0)

59.331 GREEK & ROMAN ART

A study of Greek painting, sculpture, and architecture from the Cycladic to the Hellenistic period, and an examination of Roman Art from the Etruscan age to the beginning of Christian art. Emphasis is placed on the Greek Classical period and the Roman Empire. Credits: 3 (3.0)

59.368 WOMEN IN FRENCH CINEMA

Focuses on the way French film makers (male, and more recently female) have been portraying women in their films. Carefully selected French films with English subtitles are used to show the evolution that has taken place from Carne and Renoir's poetic realism to the present. Selected readings are also used to underscore various themes, such as how women have been represented in these films. Conducted in English. Credits: 3 (0.0)

59.374 CINEMA ACROSS CULTURES

A cross-cultural study of contemporary European films with a specific focus on ethnicity. The following themes will be explored: the ethnicization of the colonial legacy, ethnicities at war, race and romance, working class ethnicities. Directors include; Sverak (Czechoslovakia), the Dardenne brothers (Belgium), Fassbinder and M. vonTrotta (Germany), Kassovitz and Klapisch (France), MacKinnon and O'Donnell (Ireland), Manchevski (Macedonia), Bodrov (Russia) Gutierrez-Aragon (Spain), Dizdar, Frears, and Prasad (UK). Prerequisite(s): No knowledge of languages other than English is required. Conducted in English. All films have English subtitles. Credits: 3 (0.0)

60.201 ACCOUNTING/FINANCIAL

Presents a comprehensive, detailed exposure to basic accounting theory. Beginning with the accounting equation, students are introduced to the accounting cycle, preparation of the statement of financial position and the income statement, accounting for assets, liabilities, and stockholders' equity of the firm, and cash flow and financial statement analysis. Credits: 3 (3.0)

60.202 ACCOUNTING/MANAGERIAL

Examines the use of accounting systems for managerial decision-making. Budgeting, forecasting, and cost accumulation systems, which relate to manufacturing systems, will be studied. Prerequisite(s): 60.201. Credits: 3 (3.0)

60.301 INTERMEDIATE ACCOUNTING I

Examines the generally accepted accounting principles relating to the preparation of financial statements. The student will study, in depth, the valuation and disclosure problems associated with the assets of the enterprise. The accounting framework and pronouncements of the Financial Accounting Standards Board are emphasized. Prerequisite(s): 60.202, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

60.331 COST MANAGEMENT SYSTEMS

This course is an upper-level management accounting course for non-accounting majors. It takes a decision-oriented approach and focuses on the manager's view, as opposed to the accountants view, of the decision process and its related information needs. Traditional cost accounting and new cost management models will be explored and contrasted, but the emphasis will be on management systems which examine a proactive role in planning, managing, and reducing costs. Prerequisite(s): 60.202, BSBA students (non-Accounting majors) and College of Management Dean permission. Credits: 3 (3.0)

61.300 INVESTMENTS

Introduction to the principles of investment. Security analysis of stocks and bonds for markets, industries and firms. Primary and secondary capital markets, money markets, and other investment alternatives in terms of risk-return tradeoffs. Options and futures as investment alternatives. Emphasis is on fundamental and technical analyses. Prerequisite(s): 60.201, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

61.301 BUSINESS FINANCE

Principles of financial management, including working and fixed capital, sources of funds, financial statements, financial planning and capital structure. Prerequisite(s): 60.201, 49.201,49.202, COM filter courses, BSBA students or Business Minor students and College of Management Dean permission. Credits: 3 (3.0)

61.303 METHODS OF FINANCIAL ANALYSIS

The techniques of financial analysis in depth. Topics covered include cash management, credit scoring, receivables monitoring, inventory management, financial statements analysis and forecasting, financial distress prediction, mergers and acquisitions techniques and other selected topics Prerequisite(s): 61.301, BSBA students and College of Management Dean permission. Credits: 3 (0.0)

61.489 INTERNSHIP IN FINANCE

Opportunity for students to earn academic credit through the integration of professional on-the-job experience and related academic work. Project jointly supervised by a faculty member and representative of the employing organization. Prerequisite(s): P: 61.301. Credits: 3 (3.0)

62.201 MARKETING PRINCIPLES

The role of marketing in the economy. The elements of the marketing mix–product, price, distribution, and promotion–are discussed in the context of social and political constraints on marketing activity. Prerequisite(s): 49.201, 48.101, 47.101. Credits: 3 (3.0)

62.313 SALES AND CUSTOMER RELATIONS

Focuses on day-to-day operating decisions in sales, customer service, and account management. Professional selling and sales forecasting. Term projects: selling exercise, marketing audit. Career relevance: develop understanding of professional selling, retail and wholesale operations, purchasing, and logistics. Prerequisite(s): 62.201 and College of Management Dean permission. Credits: 3 (3.0)

62.401 MARKETING COMMUNICATIONS

Evaluation of various marketing communication methods, including sales promotion and public relations, with an emphasis on advertising. Research, copy writing, scheduling and budgeting from the viewpoint of the marketing manager. Prerequisite(s): 62.201, BSBA students and and College of Management Dean permission. Credits: 3 (3.0)

62.406 PURCHASING AND MATERIALS MANAGEMENT

Purchasing procedures, inventory control, quality control, source selection, forward buying and speculation for the production enterprise. Prerequisite(s): 62.201, BSBA or Business Minor students and College of Management Dean permission. Credits: 3 (3.0)

62.496 CURRENT TOPICS IN MARKETING

Topics of current interest in Marketing. Subject matter to be announced in advance. For a current semester course title, please log on to ISIS, the Inter-Campus Student Information System. Prerequisite(s): 62.201, and College of Management Dean permission. Credits: 3 (3.0)

63.210 OPERATIONS ANALYSIS TECHNIQUES

Introduction to quantitative methods for analyzing business problems. Analytic methods include decision analysis, linear programming, queuing and simulation. Applications address issues in areas such as marketing, production, finance and logistics. Prerequisite(s): 49.211. Credits: 3 (3.0)

63.301 MANAGEMENT INFORMATION SYSTEMS

Structure and foundations of information systems for management from both a user's and designer's perspective. Prerequisite(s): BSBA students or Business Minor/BSIT/ASIT students with 54+ credits, and College of Management Dean permission. Credits: 3 (3.0)

63.371 OPERATIONS MANAGEMENT

Principles of production/operations management. Nature and function of production systems; operational planning and control; plant layout; materials handling; inventory and quality control. Prerequisite(s): 63.210, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

63.407 ELECTRONIC BUSINESS

This course familiarizes students with current and emerging electronic commerce technologies using the

Internet. Focus is on both Web Design and E-Business. The web design portion provides a foundation for designing dynamic interactive websites for electronic commerce. It addresses planning and developing well-designed websites that combine effective navigation with the balanced use of graphics, text, color, and database access. The electronic business section covers both the theory and practice of doing business over the Internet including issues relating to Internet technology for business advantage; managing electronic commerce funds transfer; reinventing the future of business through electronic commerce; business opportunities in electronic commerce; electronic commerce website design; social, political and ethical issues associated with electronic commerce; and business plans for technology ventures. Prerequisite(s): 63.307, 63.403, and College of Management Dean permission. Credits: 3 (3.0)

63.408 CURRENT TOPICS IN MANAGEMENT INFORMATION SYSTEMS

This course addresses one or more current topics to the field of Information Systems. Topics can change at each course offering. Typically, the course will focus on an emerging information technology, discussing fundamental concepts and the technology's application to and effect on business. Examples of possible topics are expert systems, hypermedia and hypertext systems, factory automation systems, and the planning for and management of information resources. Subject matter to be announced in advance. Visit the current semester schedule on the Continuing Studies website for more details. Prerequisite(s): 63.307, COM senior standing, and College of Management Dean permission. Credits: 3 (3.0)

63.471 MANAGERIAL QUALITY CONTROL

Views quality control from the total or company-wide perspectives. It contains traditional material on statistical process control (SPC), quality cost, quality assurance, quality information systems, as well as the recent management theories and ideas of Deming, Jurand, Ishikawa, and Taguchi. Prerequisite(s): 63.371, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

66.301 ORGANIZATIONAL BEHAVIOR

Examination of individuals, groups, and organizations from a behavioral and structural perspective. Topics include employee motivation and satisfaction, communication, power and politics, the dynamics of groups and teams, conflict management, and organizational design and change. Prerequisite(s): COM filter courses, BSBA or Business Minor/BSIT/ASIT students with 54+ credits and College of Management Dean permission. Credits: 3 (3.0)

66.310 HUMAN RESOURCES MANAGEMENT

Current issues in the management of human resources. Recruitment, selection, work force training and development, reward systems, employee health and safety, legal issues, managing diversity, performance evaluation, and human resource planning. Prerequisite(s): 66.301 and College of Management Dean permission. Credits: 3 (3.0)

66.410 NEGOTIATION STRATEGY AND PROCESS

Analysis and application of the key factors that shape and characterize different negotiation situations; the analytical skill to diagnose potential areas of difference and select appropriate strategies to address them; the interpersonal skills to tactically manage the specific communication and decision-making behaviors during the actual bargaining; and the ability to recognize how one's own personality, value system and perceptions affect the choice of tactics and behavior. Prerequisite(s): 66.301, BSBA students only, and College of Management Dean permission. Credits: 3 (3.0)

66.420 LEADERSHIP PROCESSES

Examines leadership as a dynamic influence process in organizations. The role of leader characteristics and styles, matching leadership behavior and situations, issues in power and politics, empowerment and participation, conditions for leadership effectiveness. Prerequisite(s): 66.301 and College of Management Dean permission. Credits: 3 (3.0)

66.430 REWARDS AND COMPENSATION

Examination of theories and approaches relevant to the design and implementation of monetary and non-monetary reward systems in organizations. Topics include job analysis and evaluation, pay structures, salary surveys, pay for performance, team-based pay, rewards as a vehicle of corporate strategy, and compensation administration. Prerequisite(s): 66.301 and College of Management Dean permission. Credits: 3 (3.0)

66.435 COMPARATIVE MANAGEMENT

Comparison of management concepts, systems and practices in different societies, and institutional settings. The impact of economic, social, political, and cultural variables on management styles, processes and organizational structures. Prerequisite(s): 66.301, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

66.445 CONTEMPORARY MANAGEMENT DEVELOPMENT

Provides students the opportunity to develop the skills and capabilities needed to select, gather, synthesize and use new information to enhance their professional growth and development. Prerequisite(s): 66.301, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

66.480 CURRENT TOPICS: MANAGEMENT

Topics of current interest in management. Subject matter to be announced in advance. For a current semester course title, please log on to ISIS, the Inter-Campus Student Information System. Prerequisite(s): 66.301, COM filter courses, BSBA students and COM Dean permission. Other prerequisites may be required depending on subject matter. Credits: 3 (3.0)

66.490 STRATEGIC MANAGEMENT

An integration of knowledge in the various functional areas of management toward solution of problems affecting the character and success of the total enterprise. Corporate strategy and its implementation via appropriate policies. Prerequisite(s): 96 credits and 61.301, 62.201, 63.371, 66.301, BSBA students and College of Management Dean permission. Credits: 3 (3.0)

70.240 FUNDAMENTALS OF TYPOGRAPHY

Studies lettering concepts, techniques, and the creative use of type in visual communication. Emphasis will be placed upon the history of type design and its context within the graphic design industry. Prerequisite(s): Macintosh proficiency. Credits: 3 (3.0)*

70.245 DESKTOP PUBLISHING: LAYOUT AND PRODUCTION

Introduces students to the complexities involved in preparing their designs for print: electronic page layout and design, proofing, specifying inks, trapping, cropping, overprinting, printing separations, proofing, and more. Students will learn about the differences between preparing their design work electronically or manually and will learn more about the different printing processes that are available. Printing terminologies and printing industry standards will be covered. Field trips may be made to area printing companies for demonstrations on the print production process. Prerequisite(s): Basic Macintosh proficiency. Credits: 3 (3.0)*

70.262 DIGITAL IMAGING AND PHOTOGRAPHY: PHOTOSHOP

This course will offer the student a transition between traditional photographic imaging and digital photographic imaging. The course will cover the fundamentals of digital scanning, digital capture and image manipulation. Image preparation for other media will also be explored. Basic familiarity with the Mac OS and/or Windows platforms required. Prerequisite(s): Basic Macintosh or Basic Windows proficiency. Credits: 3 (3.0)*

70.264 COMPUTER GRAPHICS & ILLUSTRATION

Students will produce a number of illustrations, starting with the traditional approach to illustration and then rendering their concepts using computer illustration and imaging software. Topics include methods for rendering artwork, capturing an expressive illustrative style, and portraying different moods or messages within the illustration. Students will learn to illustrate effectively using the many tools available to them within several software applications. Prerequisite(s): Basic Macintosh/Windows familiarity. Credits: 3 (3.0)*

70.291 INTRODUCTION TO GRAPHIC DESIGN I

Exercises, lectures and projects will introduce students to graphic design principles and techniques. Course will begin with a fundamental study of image, form, and space relations, then cover such topics as working with grids, typography basics, page layout, the introduction of color, rendering techniques, history, and more. Students will be assigned a series of projects to enhance their visual communication skills. Prerequisite(s): Basic Macintosh or Windows proficiency. Credits: 3 (3.0)*

70.362 ADVANCED DIGITAL IMAGING

Students will continue to develop their creative conceptualization skills and practice using advanced-level techniques in Photoshop as they create a number of visually compelling images. Projects will address visual problem solving for commercial applications and digital imaging as an emerging medium in fine art. Students should have basic knowledge of Photoshop and design composition skills prior to registering for this course. Prerequisite(s): 70.291 and 70.262 or comparable knowledge. Credits: 3 (3.0)*

70.376 3D ANIMATION

This course teaches the fundamentals of computer animation using 3D modeling, authoring and digital video imaging software. Students will learn how to create complex 3D objects and environments. Animation sequencing, editing, and compositing will be covered. Projects will take form as animated clips. Basic familiarity with Mac OS and/or Windows platforms required. Prerequisite(s): 70.264 or 90.231 or instructor permission. Credits: 3 (3.0)*

70.379 WEBSITE DESIGN: DREAMWEAVER

This course will focus on the creation of visual content for the web and will explore what constitutes a visually exciting and engaging site. Other topics that will be covered are: file formats, compression, web color strategies, and platform standards. Basic familiarity with Mac OS and/or Windows platforms required. Prerequisite(s): Basic HTML and Photoshop familiarity required. Credits: 3 (3.0)*

70.384 ADVANCED WEB DESIGN

This advanced-level course is designed for students who have completed Website Design (70.379). The course will cover advanced topics such as user-centered design, information architecture, testing, and usage analysis. Students will have the opportunity to further develop their design, development, and conceptualization skills. Prerequisite(s): 70.379. Credits: 3 (3.0)*

70.385 STREAMING MEDIA FOR THE WEB

This is an advanced course for those with intermediate or advanced ability in World Wide Web technology who want to explore the use of continuous feed, streaming audio, video, and 3D virtual worlds. The course will examine current technologies with special attention to emerging protocols and standards for audio and video publishing. Basic familiarity with Mac OS and/or Windows platforms required. Prerequisite(s): 70.379 or permission of instructor. Credits: 3 (3.0)*

70.391 ADVANCED GRAPHIC DESIGN

Students will be assigned a variety of advanced-level projects dealing with areas such as logo design, publication design, interactive screen design, direct mail projects, corporate identity systems, poster design, and more. Projects in this class are designed to better develop the students' ability to take a project to its

*While these 3 credit/3 contact hour design courses offered through Continuing Studies will not transfer directly into the Art Department's Bachelor of Fine Arts degree program (offered in the day school), certain two-course clusters may be accepted for transfer upon prior department approval.

final stage and render it as a professional portfolio piece. Prerequisite(s): 70.291, 70.240, and 70.245 or permission of instructor. Credits: 3 (3.0)*

70.392 DESIGN FOR ADVERTISING

Instruction in lettering and layout of commercial media as well as in the creative aspects of advertising are an integral part of the course. Practical problems and technical guidance from preliminary layouts to finished work will help prepare students for the commercial art field. Students will prepare an advertising campaign concept and translate it into a professionally designed commercial series for use in their portfolios. This course will focus on the integration of design with the overall advertising message. Prerequisite(s): 70.291, 70.240, and 70.264 or permission of instructor. Credits: 3 (3.0)*

70.400 PORTFOLIO PRODUCTION SEMINAR

This course is designed to help students to organize their work into a professional package and prepare it for presentation. Students may decide to rework existing portfolio pieces or complete additional design projects to enhance their existing portfolios and fully demonstrate their design capabilities. Mock interviews will be conducted in which students will have an opportunity to discuss their work. Includes an end-of-semester portfolio review. Prerequisite(s): 70.291, 70.240, 70.245 and 70.391 or permission of instructor. Credits: 3 (3.0)*

71.100 FUNDAMENTALS OF MUSICIANSHIP

A study of the visual and aural symbolics of music and their application to the comprehension of the architectural, organizational, and aural elements of music literature. Credits: 3 (3.0)

71.101 MUSIC THEORY 1

An intensive study of the theoretical language of music. Stresses part writing in S.A.T.B. and basso continuo realization with a free instrumental part which utilizes free voice leading relative to the use of non-harmonic activity and the harmonic principles through first and second inversion triads. Instruments of the string section are covered, and appropriate listening assignments are given. Original composition in the style being studied is required. Credits: 3 (3.0)

71.102 MUSIC THEORY 2

Serves as a continuation of the practices of 71.101 relative to part writing (both vocal and instrumental) including secondary triads, the Neapolitan sixth, modal interchange, dominant sevenths in inversion and root position, modulation, and secondary dominants. Instrumentation covers the woodwind section, and original composition in the style being covered is required. Prerequisite(s): 71.101. Credits: 3 (3.0)

71.104 AURAL SKILLS 2

Development of basic sight singing, listening and dictation skills as they relate to music theory and analysis. Activities include singing (using moveable do/tonic do solmization), listening, and dictation (melodic, harmonic and rhythmic) of more diatonic music. Music majors only. Prerequisite(s): 71.101 and 71.103. Coreq. 71.102. Credits: 1 (2.0)

71.110 BASIC MUSIC THEORY

Studies the symbolics of music and their application to the comprehension of the architectural, organizational. and aural elements of music literature. Non-Music majors only. Prerequisite(s): For Non-Music Majors only. Credits: 3 (3.0)

71.201 MUSIC THEORY 3

A continuation of practices of Music Theory II relative to part writing both vocal and instrumental including remote modulation and satellite keys, the diminished seventh, augmented sixth, ninth, eleventh, and thirteenth extensions, sequential secondary dominants and secondary sevenths. Instrumentation covers the brass section; original work in the style being covered and in various formal configuration is required. Prerequisite(s): 71.102 Credits: 3 (3.0)

71.202 MUSIC THEORY 4

A study of twentieth century music theory via a compositional approach relative to tertial, quartal, and secundal vertical sonorities, and linear combinations featuring modal and synthetic scale resources as well as serial and preserial atonality. Prerequisite(s): 71.201. Credits: 3 (3.0)

71.203 AURAL SKILLS 3

Presents an intensive application of requisite skills to chromatic and non-diatonic music, changing and composite meters, displaced accents, cross rhythms, and a vertical approach to reading often necessary in the study of scores. Advanced tonal as well as tonal literature is considered. Harmonic dictation continues to follow the sequence and progress of 71.201. Prerequisite(s): 71.104. Credits: 1 (2.0)

71.204 AURAL SKILLS 4

A concentration on the techniques employed in solving the notation and musical problems of the music of the 20th century. The consideration include synthetic and nonwestern scales, pitch sets and twelve-tone serialism. Prerequisite(s): 71.203, 71.215, 71.216. Credits: 1 (2.0)

71.490 TONAL THEORY REVIEW

A review of tonal harmony. Topics include triads, dominant and non-dominant sevenths, harmonic function and progression, embellishing tones, harmonization/part-writing, phrase structure and cadences, secondary dominants, modulation, Neapolitan and augmented sixth chords. Prerequisite(s): 71.202. Credits: 3 (3.0)

71.491 20TH CENTURY THEORY REVIEW

A review of chromatic harmony and an introduction to 20th Century harmony and techniques. Topics include borrowed chords, chromatic third relations, chromatic and enharmonic modulation, enharmonic use of chords, extended tertian harmonies, quartal harmony, modality, set theory, and serial procedures. Prerequisite(s): Credit cannot be applied toward any music degrees. Credits: 3 (3.0)

73.414 K-12 CHORAL TECHNIQUES

This course focuses on practical and effective techniques and concepts to aid choral directors in rehears-

ing and performing choral literature of various styles suitable for grades K through 12. Topics will include: choral tone, intonation and tuning, rehearsal techniques, conducting the ensemble, rhythmic considerations, linear and chordal textures, repertoire and programming decisions. Credits: 3 (3.0)

73.463 COMPUTERS IN THE MUSIC CURRICULUM

This workshop is designed to reinforce fundamental skills and concepts for incorporating computer technology into the classroom. Prior experience using computers in the music classroom is helpful, but not required. Participants will create curriculum projects using digitized sounds, MIDI-based sequencing and notation, CD-ROM resources, multimedia authoring tools, and Internet tools. Students will build a knowledge base and sets of domain-specific skills around computer-based music technologies, and will apply this knowledge to a variety of curriculum projects. At the completion of the workshop, participants will have been introduced to a variety of music software and will be able to configure standard computer and sound synthesis hardware, explain the principles of constructivist and cooperative learning, and will have prepared a variety of lesson plans that utilize computer-based technologies in both traditional and non-traditional delivery formats. Credits: 3 (3.0)

73.464 FINALE: THE ART OF MUSIC NOTATION

This workshop is dedicated to the computer-based music notation software application Finale. Beginning through advanced music notation techniques will be covered and practical applications and functional arranging techniques will be explored. Some computer experience recommended. Credits: 3 (3.0)

73.490 MULTICULTURAL MUSIC EDUCATION

This workshop explores the topic of multicultural music education including an examination of how the topic is addressed in the National Music Standards. The workshop will cover the distinctive characteristics and styles of selected musical cultures; incorporate some of the newest and most exciting resource materials available for teaching this music; and present a discussion of appropriate methods and considerations for teaching from a culturally pluralistic perspective at a variety of levels and in a variety of areas. Participants in the workshop will also have the opportunity to search the World Wide Web/Internet to access some of the newest resources and materials relevant to studying and teaching the music of diverse cultures. Credits: 3 (3.0)

74.161 MUSIC OF WESTERN CIVILIZATION

A survey of music from earliest times to the present. Significant forms, styles, composers, and aesthetic concepts are examined. Open to non-music majors only. Credits: 3 (3.0)

74.261 MUSIC HISTORY I

Studies sacred and secular musical forms from pre-Christianity to 1750. Credits: 3 (3.0)

74.386 HISTORY OF ROCK MUSIC

Traces the roots of American popular music from its origins and influences from the earliest European song forms to American folk songs, Gospel, Country, Rhythm and Blues, Jazz, and other popular forms up through current trends as related to the development of the music industry and other socio-musical influences of the commercial song from the 1500s to the present. Credits: 3 (3.0)

78.201 INTRODUCTION TO AUDIO FOR MULTIMEDIA AND THE WORLD WIDE WEB

CSCDE Course Name: Introduction to Audio for Multimedia and the World Wide Web
This course provides participants with the technical background in audio they will need for effective Multimedia and Web-based use of sound. Topics begin with the fundamental concepts of audio signals, recording and reproduction systems, and proceed to a more in-depth understanding of digital audio recording, signal processing, and data compression. Parameters such as sample rate, bit rate and dither will be linked to sound quality issues of frequency response, noise floor and dynamic range so that informed decisions can be made about sound performance versus data requirements. The course will explore the audio concepts and capabilities unique to Audio Compact Disc, DVD-Video, DVD-Audio, CD-Rom, MP3 and streaming. Students' projects will integrate audio into Multimedia and/or Web-based products satisfying priorities for sound quality, media effectiveness, user experience and bandwidth constraints. Prerequisite(s): Introduction to Multimedia or HTML recommended. Credits: 3 (3.0)

78.301 MUSIC, TECHNOLOGY AND SOCIETY

Examines how recording technology has changed music and the relationships of music and society. The course studies and evaluates the application of technology to making music, to music listening, to styles of music, and to music's roles in society, other art forms, and media. The evolving importance of technology in music over the past century is charted through the study of musical examples and through viewing how human values are reflected in this century's timely music. Studies will be based on assigned readings, lectures and discussions, examination of current and historically significant music recordings, motion pictures and media pieces for this artistry, their use of available technology, and their impact on human values and society. Credits: 3 (3.0)

78.493 INTERNSHIP IN SOUND RECORDING TECHNOLOGY

Practical experience in audio-recording under the supervision of a professional firm. At least twenty hours per week for fifteen weeks is spent working at an entry-level position for a firm involved in audio. Prerequisite(s): Permission of Chair. Credits: 6 (3.0)

79.352 AESTHETICS CRITICAL STUDY IN CONTEMPORARY ART AND CULTURE

Examination of issues of content, theory, and criticism in contemporary and traditional art and culture. Topics vary. Prerequisite(s): 58.203, 58.204. Credits: 3 (0.0)

81.111 PRINCIPLES OF BIOLOGY I

Introduces topics such as the chemical and physical basis of life, its evolution, diversity, distribution, and interrelationships of life forms. The central theme of genetic replication, translation, expression, and selec-

tion will be emphasized as a unifying principle which determines and integrates structure and function at the cellular, individual population, and community levels of organization. Designed for those students who intend to pursue career options in the biological sciences, biotechnology or related areas such as medicine, biomedical research, radiological sciences or environmental sciences. It is the first-semester course of a two-semester sequence. Prerequisite(s): Corequisite: 81.113. Credits: 3 (3.0)

81.112 PRINCIPLES OF BIOLOGY II

Serves as a continuation of the 81.111/81.112 sequence for those students who intend to pursue career options in the biological sciences or related professional areas such as medicine, biomedical research or environmental sciences. Molecular energy exchange in organisms (photosynthesis and respiratory metabolism), the common functional needs of support, locomotion, nutrition, internal communication and the maintenance of homeostasis are considered. Control and regulation of organisms at levels beyond the individual are considered through discussions of population and community ecology. Prerequisite(s): 81.111. Corequisite: 81.114. Credits: 3 (3.0)

81.113 INTRODUCTION EXPERIMENTAL BIOLOGY I

Presents a series of field trips and laboratory exercises designed to introduce the student to concepts of the distribution and maintenance of life. Specific consideration is given to the diversity and organization of local ecosystems; the continuation of life is considered through exercises covering mitosis, meiosis, genetics, and evolutionary biology. Prerequisite(s): Corequisite: 81.111. Credits: 1 (4.0)

81.114 PRINCIPLES OF BIOLOGY II LABORATORY

Provides laboratory experiments, analyses, and dissections designed to introduce the student to biological techniques and processes at the sub-cellular, cellular, and organ systems levels. Prerequisite(s): Corequisite: 81.112. Credits: 1 (3.0)

81.320 BOTANY

Serves as an introduction to the study of the plant kingdom dealing with the structure, function, and diversity of plants with an emphasis on seed plants. The physiology, morphology, and taxonomy of plants is emphasized. Prerequisite(s): Corequisite: 81.322. Credits: 3 (3.0)

81.322 BOTANY LABORATORY

Emphasizes material covered in 81.320 using field and laboratory exercises. Prerequisite(s): Corequisite: 81.320. Credits: 1 (3.0)

82.205 GENETICS FOR THE COMPUTER SCIENTIST AND MATHEMATICIANS

This course assumes no previous experience in Biology. Focus is on the following topics and their relation to the genomics revolution: the genetic code, transcription, translation, Mendelian and non-Mendelian inheritance, mitosis and meiosis, linkage mapping, gene structure and function, regulation of gene expression, DNA replication and repair, population genetics, quantitative genetics, evolutionary genetics.Not suitable for credit towards any degree in the Division of Sciences. Credits: 3 (3.0)

83.100 INTRODUCTION TO BIOLOGY

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life.Not suitable for credit towards any degree in the Division of Sciences. Prerequisite(s): Not for Biology majors. Credits: 3 (3.0)

83.101 LIFE SCIENCE I

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life.Suitable as a Natural Science Elective for a degree in the Division of Sciences. Credits: 3 (3.0)

83.102 LIFE SCIENCE II

Emphasis is on systems structure and function. The cellular organization of plants and animals leads into physiological processes of higher organisms with great emphasis on humans. Among topics considered are nutrition and digestion, cellular metabolism, circulation, respiration, excretion, nervous and skeletal-muscular systems. Also considered are the chemical interactions of these systems with immunity, hormonal and reproductive processes.Suitable as a Natural Science Elective for a degree in the Division of Sciences. Prerequisite(s): Corequisite: 83.104. Credits: 3 (3.0)

83.103 LIFE SCIENCE I LABORATORY

Concerned with experimentation and interpretation of some of the concepts of Life Science I.Suitable as a Natural Science Elective for a degree in the Division of Sciences. Prerequisite(s): Corequisite: 83.101. Credits: 1 (2.0)

83.105 INTRODUCTION TO BIOLOGY LAB

Concerned with experimentation and interpretation of some of the concepts of Life Science I.Not suitable for credit towards any degree in the Division of Sciences. Prerequisite(s): Corequisite: 83.100; not for Biology majors. Credits: 1 (3.0)

83.125 PLANTS AND HUMAN SOCIETY

This course is designed primarily to fulfill the science elective requirement for the non-science major. Its purpose is to provide the undergraduate student who is not majoring in the biological sciences with an introduction to the study of plants and their importance in our everyday world. The importance of plants in agriculture, medicine and industry will be emphasized.Not suitable for credit towards any degree in the Division of Sciences. Credits: 3 (3.0)

83.127 PLANTS & HUMAN SOCIETY LAB

Not suitable for credit towards any degree in the Division of Sciences. Prerequisite(s): Corequisite: 83.125. Credits: 1 (0.0)

83.214 HUMAN ECOLOGY

Designed to reveal and discuss the increasing problems of overpopulation in regard to environmental deterioration, living space, limits of natural resources and the adverse effects of human alteration on destruction of the natural ecosystem. The implications of current literature and news items will be emphasized.Not suitable for credit towards any degree in the Division of Sciences. Credits: 3 (3.0)

84.101 APPLIED CHEMISTRY FOR NON-SCIENTISTS

Provides an understanding of basic chemical principles atomic structure, bonding and interparticle forces, physical and chemical properties of matter through hands-on examination of matter and the application of principles to understanding the chemistry of current issues (e.g., environmental chemistry, biochemistry, food and drug chemistry) and the analysis of problems dealing with these issues.This course is not available for credit for Science or Engineering majors. Credits: 3 (3.0)

84.111 GENERAL CHEMISTRY I

Provides a one-semester survey of inorganic chemistry: the structure and properties of matter, chemical reactions, stoichiometry, gas laws, solution chemistry, kinetics, equilibrium, and acid-base chemistry. Prerequisite(s): Corequisite: 84.113. Credits: 3 (3.0)

84.112 GENERAL CHEMISTRY II

Surveys the basic principles of organic chemistry and biochemistry with emphasis on biochemical aspects of carbohydrates, lipids, proteins and nucleic acids. Various metabolic pathways are also emphasized. Prerequisite(s): 84.111 or permission of instructor. Corequisite: 84.114. Credits: 3 (3.0)

84.113 GENERAL CHEMISTRY LABORATORY I

Lab experiments designed to illustrate the principles covered in 84.111. Prerequisite(s): Corequisite: 84.111. Credits: 1 (3.0)

84.114 GENERAL CHEMISTRY LABORATORY II

Uses laboratory experiments designed to illustrate the principles discussed in 84.112. Prerequisite(s): 84.113 or permission of instructor. Corequisite: 84.112. Credits: 1 (3.0)

84.121 CHEMISTRY I

Provides an introduction to the basic concepts of chemistry through classroom discussions and demonstrations. Topics include chemical calculations, atomic structures, the periodic table, basic bonding theory, solutions, liquids, and gases. Restricted to science, engineering, and engineering technology majors. Prerequisite(s): Corequisite: 84.123. Credits: 3 (4.0)

84.122 CHEMISTRY II

Serves as a continuation of 84.121. Topics include thermodynamics; kinetics, acids and bases; an introduction to organic chemistry; chemical equilibrium; precipitation reactions; and electrochemistry. Restricted to science, engineering, and engineering technology majors. Prerequisite(s): 84.121 and 84.123. Corequisite: 84.124. Credits: 3 (4.0)

84.123 CHEMISTRY I LABORATORY

Studies experimental chemical principles and chemical transformation that is coordinated with topics considered in 84.121. Some of the more important reactions of elements, oxides, acids, bases, and salts are examined. Other topics include chemical separation, purification, preparation of inorganic salts, quantitative determinations dealing with the formula of a compound, gas laws, and colligative properties. Careful techniques and precise measurements are stressed. Restricted to science, engineering, and engineering technology majors Prerequisite(s): Corequisite: 84.121. Credits: 1 (3.0)

84.124 CHEMISTRY II LABORATORY

Serves as a continuation of the laboratory study begun in 84.123 that is coordinated with topics of 84.122. Topics include: thermochemistry, kinetics, spectroscopy, titration, pH, equilibrium reaction and constants. Some aqueous solution reactions and organic reactions are examined. Accurate measurements and precise instrumental and apparatus operation are expected. Restricted to science, engineering, and engineering technology majors. Prerequisite(s): Corequisite: 84.122 Credits: 1 (3.0)

84.221 ORGANIC CHEMISTRY IA

Studies the basic principles and reactions which characterize the chemical behavior of carbon compounds. Nomenclature, reactions, reaction mechanisms, and stereochemistry will be covered. Required for chemistry majors. Prerequisite(s): 84.122 and 84.124. Corequisite: 84.227 or 84.229. Credits: 3 (3.0)

84.222 ORGANIC CHEMISTRY IIA

A continuation of 84.221 including an introduction to infrared and NMR spectroscopy and biochemistry. The application of organic reactions in multi-step synthesis is stressed. Prerequisite(s): 84.221. Corequisite: 84.228 or 84.230. Credits: 3 (4.0)

84.229 ORGANIC CHEMISTRY LABORATORY IA

Reviews techniques, skills, and heuristic approaches in the synthesis, purification, and identification of organic compounds. IR, GC, and NMR instrumental methods are included. Prerequisite(s): Corequisite: 84.221. Credits: 1 (4.0)

84.230 ORGANIC CHEMISTRY II A LAB

A continuation of 84.229. Prerequisite(s): 84.229. Corequisite 84.222. Credits: 1 (4.0)

84.314 ANALYTICAL CHEMISTRY II

Introduces modern instrumental methods of chemical analysis. Topics to be discussed include ultraviolet, infrared nuclear magnetic resonance, emission and atomic absorption spectroscopy. Mass spectrometry, chromatography, thermal and electrochemical methods of analysis will also be covered. Prerequisite(s): 86.122, 99.133. Corequisite: 84.316. Credits: 3 (3.0)

84.316 ANALYTICAL CHEMISTRY LABORATORY II

Presents laboratory experiments designed to complement the coverage of topics in 84.314. Prerequisite(s): 86.122. Corequisite: 84.314. Credits: 2 (4.0)

86.121 ANALYTICAL CHEMISTRY A

Discusses the principles and calculations of gravimetric and volumetric analysis. Material is presented in class and laboratory format. Prerequisite(s): 84.122, 92.115. Credits: 3 (3.0)

86.131 ENVIRONMENTAL CHEMISTRY I

Emphasizes basic chemical theory. Reactions and equations are presented, along with an introduction to

the structure and character of water, its impurities, and the chemical treatment schemes that have been devised to deal with them. Credits: 3 (3.0)

86.132 ENVIRONMENTAL CHEMISTRY II

Serves as a continuation of 86.131. The course covers specific water and wastewater treatment practices, such as chlorination, coagulation, filtration and absorption, with a focus on analytical techniques for the particular parameters of interest. Wet chemistry as well as instrument methods are discussed and demonstrated during lab sessions that complement the lecture material. Credits: 3 (3.0)

86.223 PRINCIPLES OF ORGANIC CHEMISTRY I

Discusses structure, classification by functionality, nomenclature, synthesis and reactions as well as mechanisms of reactions of organic compounds. Prerequisite(s): 84.122. Corequisite: 86.225. Credits: 3 (3.0)

86.224 PRINCIPLES OF ORGANIC CHEMISTRY II

Serves as a continuation of 86.223. Prerequisite(s): 86.223. Corequisite: 86.226 or permission of coordinator. Credits: 3 (3.0)

86.225 PRINCIPLES OF ORGANIC CHEMISTRY I LABORATORY

Provides laboratory work that is scheduled to accompany topic presentations in the lecture (86.223) and will be devoted to product separation and purification techniques, methods of synthesis of important compounds and instrumental analytical techniques. Prerequisite(s): Corequisite: 86.223. Credits: 1 (3.0)

86.226 PRINCIPLES OF ORGANIC CHEMISTRY II LABORATORY

Serves as a continuation of 86.225. Prerequisite(s): 86.225. Corequisite: 86.224 Credits: 1 (1.0)

86.334 ADVANCED INORGANIC CHEMISTRY

Introduces modern theories of atomic structure and chemical bonding with emphasis on physical/chemical principles and properties. Considerable time will be spent on coordination compounds, including topics such as descriptive chemistry, biochemical importance, and ligand field theory. Prerequisite(s): 84.345. Credits: 3 (3.0)

87.115 ASTRONOMY

Offers an introduction to the study of astronomy including historical development, instruments, solar system dynamics, planetary evolution, stellar systems and stellar evolution. Several field trips are included.This course satisfies the Gen Ed science requirement, but not specific science requirements for majors in the Division of Science. Credits: 3 (3.0)

87.117 ASTRONOMY LAB

Intended to develop a deeper understanding of astronomy through an exposure to the methods and materials used in astronomical analysis. Corequisite: 87.115. Prerequisite(s): Credits: 1 (2.0)

87.406 GEOGRAPHIC INFORMATION SYSTEMS

This course will cover the elements of a Geographic Information System commonly found in basic and mid-level GIS applications. This will include file organization, data entry including digitizing and image registration, geocoding, Structured Query Language (SQL) applications, map algebra and statistical model functions, as well as general issues related to GIS implementation and GIS product presentation in organizational settings. Credits: 3 (3.0)

87.408 INTRODUCTION TO GIS USING ARCVIEW

This is an introductory course in GIS. The course will attempt to cover the basic concepts associated with Geographic Information Systems while at the same time developing familiarity with the ArcView GIS platform. Prerequisite(s): Some experience with Windows would be helpful. Credits: 3 (3.0)

90.111 FUNDAMENTALS OF ALGEBRA

Intended for students with little or no background in basic algebra or whose background is not current. Topics covered include: the real number system, factoring fractions, linear equations, functions, graphs, systems of equations, and the quadratic equation. Students will not receive credit for this course toward any degree program at the University of Massachusetts Lowell. Credits: 3 (3.0)

90.112 CONCEPTS IN ALGEBRA I

Designed for students whose background in basic algebra is current. The emphasis is on applications to the management and social sciences. Topics covered include: an introduction to set notation, linear equations, inequalities, quadratic functions, and matrices. Credit is not given for both 90.112 and 92.121. Prerequisite(s): 90.111 or satisfactory score on the Math Placement Exam given the first week of class. Credits: 3 (3.0)

90.119 CONCEPTS IN ALGEBRA II

Serves as a continuation of 90.112. Topics covered include: the mathematics of finance, linear programming, optimization, and an introduction to differential calculus. Prerequisite(s): 90.112. Credits: 3 (0.0)

90.160 INTRODUCTION TO INFORMATION SYSTEMS

Provides the non-Information Systems student with an understanding of how computer hardware and software are combined to build efficient and effective information systems for business professionals. The course takes a user's orientation toward the use of the application tools, how to develop applications without programming, how users can build decision support systems, how to use the structured system development life cycle, how to control information systems and life cycle, and how personal computers can be interfaced with other systems. Credits: 3 (3.0)

90.171 MICROSOFT® ACCESS

This introductory course is intended to teach students how to create and manipulate database files using Microsoft Access 2000. Students will learn about database management, relational databases, and the issues that must be considered before creating a database. They will learn how to create a database file with tables, queries, forms and reports. Topics include

entering and editing data; sorting, filtering and printing records; extracting information with different types of queries; designing and customizing forms and reports; creating charts and pivot tables; and customizing Access. In addition, they will learn how to use macros to automate a database, and how to exchange Access data with other applications. Credits: 3 (3.0)

90.180 MICROSOFT® EXCEL

This course will look at all the features of Excel that make it the powerful business tool that it is. The following topics will be discussed: the basics of workbooks and worksheets, including worksheet concepts and terminology; creating a workbook file with arithmetic and function formulas; editing and formatting features that are available for manipulating the data in a worksheet; printing and page setup issues; creating charts to graphically represent worksheet data; and exploring the ways in which Excel can be used for list management purposes. In addition, students will learn the tips, tricks and shortcuts that are available in Excel for doing things efficiently; for example, advanced formulas, including links and What If? analysis; Excel's statistical, lookup, time and date, and IF functions. Students will explore a number of the powerful ways in which they can summarize worksheet data in Excel: those include outlining, consolidation, and pivot tables; creating macros in Excel using Visual Basic for Applications, to automate reports and eliminate redundancy in worksheet creation and manipulation. Prerequisite(s): 90.202 or equivalent. Credits: 3 (0.0)

90.202 MICROSOFT® OFFICE

This is an intensive hands-on course intended to teach the student basic personal computer skills in a lecture/lab format using MS Office. The student will learn the fundamental concepts of word processing, spreadsheets, and presentation development. Credits: 3 (3.0)

90.211 INTRODUCTION TO PROGRAMMING W/C I

Offers an introduction to the processing of information by computer. Computer logic, memory, input/output processing, and programming in the 'C' language. Students may not receive credit for both the 90.211/90.212 sequence and 90.267. Prerequisite(s): No previous programming experience required. Credits: 3 (3.0)

90.212 INTRODUCTION TO PROGRAMMING WITH C - PART II

Serves as a continuation of 90.211. Additional topics will include pointers, dynamic memory allocation, file handling techniques and libraries. Students may not receive credit for both the 90.211/90.212 sequence and 90.267. Prerequisite(s): 90.211. Credits: 3 (3.0)

90.220 VISUAL BASIC

This course will focus on developing Windows-based programs using the Visual Basic programming environment. Topics covered will include the use of text boxes, labels, scroll bars, menus, buttons, and the Windows applications. Students should be familiar with the Windows environment and with at least one programming language prior to taking this course. Credits: 3 (3.0)

90.224 ADVANCED VISUAL BASIC

This course has been designed for those who already are familiar with the fundamentals of Visual Basic programming and are interested in advanced application developments. The following main areas are proposed to be covered: Use of professional controls, Using system objects and creating own objects, Programming with API and extending applications with API, MCI control and Multimedia programming, Building ActiveX components and creating/using DLL's, Introduction to programming with MAPI, TAPI, and Data Communications, Using Data Access Objects and generating Database applications for client server, Introduction to VB scripting and Internet programming, and Application Distributions - creating help files and application distribution using setup/install. Prerequisite(s): 90.220. Credits: 3 (3.0)

90.227 DEVELOPING INTERACTIVE HELP SYSTEMS: MACROMEDIA® ROBOHELP®

This course is designed for technical writers, project managers, web developers and designers or anyone interested in creating, developing, and managing Help systems. Students will learn to use Macromedia's RoboHelp to create professional Help systems and documentation for desktop and web-based applications, including CD-ROMs, .NET and Rich Internet Applications. Students will learn to create Table of Contents, Index, Glossary, context-sensitive Help, and how to generate Help systems in any popular online Help format, plus press-ready printed documentation. Students will also explore the use of RoboDemo as a potential add-in to make help systems more interactive by incorporating Flash movies and video. Prerequisite(s): Familiarity with technical writing and/or web/multimedia development. Credits: 3 (0.0)

90.228 INTRODUCTION TO ADOBE® FRAMEMAKER

This introductory course teaches the fundamentals of Adobe FrameMaker, the tool of choice for technical documentation professionals. Using a hands-on approach, the student will learn how to validate an EDD, understand the concepts of DTD, SGML, and XML, work with formats in a structured template, validate XML and SGML documents, work with markup languages, import and export documents to other formats, and more. Credits: 3 (0.0)

90.230 INTRODUCTION TO MULTIMEDIA

Provides participants with an overview of multimedia and its professional applications in training, education, marketing, and entertainment. Scanning images, digitizing video and audio, and exploring the design and production of interactive multimedia are the focus of this class. Includes technical/hardware considerations and production procedures pertinent to interactive multimedia. Prerequisite(s): Basic Macintosh or Windows proficiency. Credits: 3 (3.0)

90.231 GRAPHICS FOR MULTIMEDIA AND THE WORLD WIDE WEB

The focus of this class is on the basic components of shape, color, texture, typography, and images as they are applied to multimedia and web interface design. Other topics covered include scanning, image editing, resolution and color palettes. Students will work on projects that integrate elements such as buttons, navi-

gation bars, and background images to communicate creative visual information. Photoshop will be used. Prerequisite(s): 90.230. Credits: 3 (3.0)

90.232 DESKTOP VIDEO PRODUCTION

This course covers basic camera and editing techniques for desktop video production. Using camcorders, VCR's, computers and appropriate software applications, participants will create desktop video projects. Prerequisite(s): 90.230. Credits: 3 (3.0)

90.236 INSTRUCTIONAL DESIGN FOR INTERACTIVE MEDIA

This course is designed to deliver the basics of instructional design techniques with an emphasis on educational media. The foundations of instructional design include thoughtful problem analysis, identification of training needs, establishing instructional goals, selecting and optimizing an instructional strategy, scripting, flowcharting, storyboarding a project, creating formative evaluation and revision cycles, and creating summative evaluations to measure effectiveness. Prerequisite(s): 90.230 or permission of instructor. Credits: 3 (3.0)

90.238 WEBSITE DEVELOPMENT: MICROSOFT® EXPRESSION® WEB

This course focuses on the design, development, and implementation of websites using available visual development tools. Each participant will design, build, and maintain their own websites. Topics covered include: basic navigational structure; page layout incorporating tables and frames; graphical design and placement; image maps; streaming audio and video; and basic website administration. Prerequisite(s): 90.291; 90.231 recommended. Credits: 3 (3.0)

90.246 ACTIVE SERVER PAGES .NET

With more data online, the web interface is becoming the primary tool for serving up databases in the enterprise and on the Internet. Topics covered include: what is ASP.NET; server-side scripting; Web Forms; validation, file I/O; database access components; basic SQL commands; and debugging techniques. Prerequisite(s): HTML and previous programming experience required. Credits: 3 (3.0)

90.247 WEB AUTHORING: ADOBE® FLASH®

This course will demonstrate how to use web authoring applications to create cutting-edge interface, navigation, and streaming animation. Using open standard vector formatting, you can create interactive capabilities on the web similar to CD-ROM screens. You'll learn how to use drawing tools to create websites that include sound, clickable buttons, interactivity, and exciting animations. Applications such as Macromedia Shockwave and Flash will be used. Prerequisite(s): 90.291; 90.302 or programming familiarity. Credits: 3 (3.0)

90.250 E-COMMERCE ON THE WEB

This course examines the impact of emerging technologies on how we conduct business in a wired world. Topics include: ingredients for a Commerce-Enabled Web site from hardware and software to necessary operational processes; copyright, authentication, encryption, certification, and security; on-line payment strategies (SET, E-cash, check, and charge) and companies offering solutions: E-Commerce Business Models. Prerequisite(s): 90.238. Credits: 3 (3.0)

90.267 C PROGRAMMING

Introduces students to the techniques of programming in C. The language syntax, semantics, its applications, and the portable library are covered. This course is not an introductory course in programming. However, it will teach some of the basics in the first few weeks. Students should have a working knowledge of at least one high-level programming language. Prerequisite(s): Previous programming experience. Credits: 3 (3.0)

90.268 C++ PROGRAMMING

This course will cover the C++ language and show the student how to use the language. We will cover class construction, operator overloading, virtual functions, templates, and introduce the student to the IO streams. Inheritance and its use in creating extendible libraries will be presented. Object-oriented concepts will be presented in the context of the C++ language and its support for object-oriented programming. Prerequisite(s): 90.267 or 90.212. Credits: 3 (3.0)

90.269 ADVANCED C++

Serves as a continuation of 90.268, with emphasis on Object Oriented Programming with C++. Design issues and programming guidelines will be discussed. Inheritance, dynamic binding, overloaded operators, abstract classes, and class hierarchies will be covered in more detail, with course projects concentrating on these areas. Prerequisite(s): 90.268, experience with Data Structures. Credits: 3 (3.0)

90.270 VISUAL C++.NET

This course introduces students to Windows programming. Students learn how to create a Windows application using both native and managed code. Native programming which allows us to create fast applications and managed code which is core of the .NET is compared and contrasted throughout the course. Course topics and hands-on exercises will cover: creating variety of windows, internet programming, creating Web services, using and creating databases and database programming and database connectivity, multithreaded programming, dynamic link libraries (dlls). Course will discuss interoperability with other languages (C# and VB) and with other software. Prerequisite(s): 90.268. Credits: 3 (3.0)

90.271 C# PROGRAMMING

The purpose of this course is to transition the student from traditional non-Internet and Web-based applications to Internet and Web-based applications using the C# language. Some of the topics that will be discussed in the course are: object-oriented programming, graphical-user-interface concepts, event driven programming, multithreading and web-based client/server networking, relational database models and distributed computing. Prerequisite(s): 90.268 or 90.301. Credits: 3 (3.0)

90.280 INTRODUCTION TO WINDOWS PROGRAMMING

This course lays the theoretical groundwork upon which practical Windows applications are built for the

32 bit environment (Windows 95/Windows NT/Windows 98/Windows 2000/Windows ME). Students will explore the major topics involved in mainstream Windows programming. Starting with a simple starter program to act as a framework, students will delve into painting with text, keyboard and mouse input, the timer, child window controls, memory management, resources, menus and accelerators, dialog boxes, GDI and graphics, bitmaps, and fonts. After completing the course, students will be able to design and write useful, technically sound Windows applications and understand the theoretical underpinnings of Windows programming. Prerequisite(s): 90.267. Credits: 3 (3.0)

90.291 INTRODUCTION TO DHTML

Starts with the basics of Dynamic Hypertext Markup Language using the tool that most professional Web developers use - Homesite. The course covers the W3C standards for HTML 3.2 and 4.0, Web protocols, Web server basics, Web design theory, and provides a survey of Javascript, Cascading Style Sheets, XML, Perl, and Dynamic HTML. Credits: 3 (3.0)

90.292 ADVANCED DHTML

A continuation of the introductory course, this course focuses on properties of Cascading Style Sheets and using them with JavaScript to create Dynamic HTML. The student is required to know basic HTML before enrolling in this class. The Document Object Model (DOM) for IE is covered in depth. Prerequisite(s): 90.291. Credits: 3 (3.0)

90.297 INTRODUCTION TO JAVA PROGRAMMING

This course introduces students to object oriented programming with Java. Basic concepts are introduced early, with a strong focus on classes. Additional topics include event driven (Windows) programming and object-oriented design. Note that this is not an introductory course to programming - Students are expected to have a working knowledge of a least one high-level programming and/or scripting language (or equivalent experience) and basic familiarity with programming (using a text editor, etc). However, it will teach some basic programming concepts during the first few weeks. Previous programming experience required. Requires the Sun Java Development Kit. Prerequisite(s): Previous programming experience required. Credits: 3 (3.0)

90.301 JAVA PROGRAMMING/WINDOWS

The JAVA programming language is now being used to write distributed Internet applications. Unlike traditional languages, the JAVA language was designed to be used on a network. Thus, it contains features needed to build efficient distributed applications that employ Internet resources. Those who intend to design World Wide Web information systems that fully utilize the Internet must have a working knowledge of this vital technology. This course allows students to explore features that set JAVA apart from traditional programming languages; obtain an overview of object-oriented design as it applies to JAVA; learn about the fundamental constructs of the JAVA programming language; and write, compile, and include simple JAVA Applets within the content of HTML documents. Prerequisite(s): 90.297 or 90.268. Credits: 3 (3.0)

90.302 JAVASCRIPT

An introductory course designed for the student who has mastered HTML and would like to add interactivity to his or her web sites. Topics covered include basic JavaScript programming, creating interactive forms, using frames and cookies, working with graphics and multimedia. Students will incorporate various JavaScript programs to their existing website. Prerequisite(s): 90.291 or knowledge of HTML. Credits: 3 (3.0)

90.303 ADVANCED JAVA PROGRAMMING

This course description is to be used for the on-campus course only. For online course description, see the Online site. This course assumes knowledge of the Java programming language, including exceptions, interfaces, and inner classes. It also assumes knowledge of the Java 1.1 event model and AWT. Topics covered include: Advanced AWT, Swing (both the lightweight AWT replacement components and the advanced components, such as Tables and Trees), streams, multithreading, network programming, database connectivity (JDBC), remote objects (RMI), JavaBeans, security, internationalization, and native methods. Prerequisite(s): 90.301. Credits: 3 (3.0)

90.305 INTRODUCTION TO PERL

The Perl programming language has gained popularity in recent years, due in part to the ease with which it can perform multiple tasks, such as UNIX system administration, application to Common Gateway Interface (CGI), World Wide Web (WWW). In this course, students examine the language's syntax, unique features, and Perl program development. Course projects will focus on developing CGI programs for Intranet and Internet deployment. Prerequisite(s): 90.267. Credits: 3 (3.0)

90.306 INTRODUCTION TO XML

XML (eXtensible Markup Language) picks up where HTML leaves off. If you've studied HTML, you've learned the Web's formatting language. To structure content on the Web, you will need to learn XML. In this introductory course, you will learn basics of XML and the DTD (Document Type Definition), XSL (the style sheet for XML), and CDF (Channel Definition Format) commonly used in push technology. Prerequisite(s): 90.291 and 90.474, or instructor permission. Credits: 3 (3.0)

90.307 ADVANCED TOPICS IN JAVA AND XML

This advanced level Java programming course focuses on Java application development using XML and XSLT. This course assumes an intermediate level understanding of Java programming. Upon completion you will understand the basic XML and XSLT concepts, and how Java can be used to take full advantage of these technologies. Throughout this course we will be developing a distributed real estate listing service. Students will participate in implementing the representation and processing of information for this application, initially with a classical representation, and progressing towards an XML and XSLT implementation. This progression will highlight the benefits of using XML and XSLT for data representation and processing. Additional topics include DTD, DOM parsers, SAX parsers, JDOM, and object-oriented Java programming techniques. Prerequisite(s): 90.303, 90.306. Credits: 3 (3.0)

90.311 INTRODUCTION TO THE UNIX OPERATING SYSTEM

Addresses manipulating and maintaining files within the UNIX file system; creating and editing text files using the vi and ed editors; using pipes, redirection, and filters; using advanced text processing utilities; using electronic mail; writing and debugging shell scripts; submitting and executing processes. Credits: 3 (3.0)

90.312 SHELL SCRIPTING

Teaches the students the techniques of programming in the high-level programming language of the Bourne, Korn, and BASH Shells. The course covers the building blocks necessary to create portable shell scripts that can be used as new utilities for computers running either UNIX, Linux, or the Cygwin environment on Windows. Prerequisite(s): 90.311, and 90.267 or 90.212. Credits: 3 (3.0)

90.313 UNIX INTERNALS OVERVIEW

Focuses on the fundamentals of UNIX kernel architectures. Topics covered in this course are: the file system, process creation, signals, process scheduling, context switching, memory management, virtual memory device driver basics and the I/O subsystem, system boot, the init process. Prerequisite(s): 90.312. Credits: 3 (3.0)

90.316 UNIX SYSTEM ADMINISTRATION

Addresses the fundamentals necessary to set up/adjust a UNIX system to produce an efficient and secure operating system environment. System starting and shutdown, file system partitioning and maintenance, user and group administration, backup and recovery, setting up terminals, printers and communications devices are topics which will be discussed. Prerequisite(s): 90.312 Credits: 3 (3.0)

90.319 INTRODUCTION TO LINUX

Course addresses management of the Linux file system and utilities; file editing; file permissions; pipes, redirection, and filters; text handling utilities; mail facility; BASH shell, variables, and basic scripts; process management; and shell programming basics. Course content mirrors 90.311 but focuses on usage of Linux as an alternative UNIX-based operating system. Students will be exposed to Linux principles through hands-on labwork utilizing a Linux server. Credits: 3 (3.0)

90.320 SHELL SCRIPTING USING LINUX

This course will look at the theory and practice of scripting languages through a detailed study of two- the bash shell language and the Python graphical scripting language. While these languages are different in form and execution we'll discover the similarities and give you the skills to more easily pick up other popular languages such as TCL/TK, PHP and many more. The student will discover the techniques learned may also improve their skills with compiled languages like C and C++. Credits: 3 (3.0)

90.321 LINUX SYSTEM ADMINISTRATION

The course will start by exploring the booting and setting up stand-alone system. Students will learn how to set up and manage user accounts, how to manage other resources such as disk space, CPU usage and user access to shared resources with maximization of security in mind. Since virtually all systems are networked today we will proceed to learn about e-mail (POP and SMTP protocols), Web servers and networking services. The course will present the following Internet services: DNS, FTP, telnet, HTTP (Apache Web Server), SSH. The intranet topics will be discussed including Network File System (NFS), Network Information Services (NIS) and interoperability with Windows system via Samba. At the conclusion of the course students will explore topics in networking: network configuration, security and interoperability. Prerequisite(s): Shell Scripting experience. Credits: 3 (3.0)

90.342 WEB-ENABLED DATABASE DEVELOPMENT (FORMERLY RELATIONAL DATABASE INTEGRATION)

This course expands on the topics introduced in the Relational Database Concepts course. Using the Linux operating system, the PHP scripting language, and the Postgresql relational database, students will develop modern internet applications, such as online catalogs, discussion areas, and auction sites. Prerequisite(s): 90.474. Credits: 3 (3.0)

90.347 RICH WEB DEVELOPMENT: ADVANCED FLASH®

This course picks up where other Flash courses end. Go beyond developing animations; learn how to use Flash to develop complete interactive websites, to develop presentations for Web/CD/DVD delivery, and to develop applications for internet, intranet and alternate devices. Learn to understand and write ActionScript (Flash's programming language) and design in OOP (Object-oriented programming). You'll learn how to use sound, buttons, interactivity, and animations to enhance the user's experience. Learn the fundamentals of Flash Communication Server, Flash Remoting and Flash-Database Integration. Prerequisite(s): 90.247. Credits: 3 (3.0)

90.348 DEVELOPING DYNAMIC WEBSITES WITH COLDFUSION®

Developing Dynamic Websites with ColdFusion MX is a course that provides web designers and developers with the knowledge and hands on training they need to begin developing interactive websites using Macromedia's powerful web application platform ColdFusion MX using the Dreamweaver MX website authoring tool. Students will learn how to build secure, interactive, database-driven web applications that maintain session state across pages. Prerequisite(s): 70.379 and 70.384, or prior familiarity with Dreamweaver. Credits: 3 (3.0)

90.360 INTRODUCTION TO DATA STRUCTURES

This course presents the basic concepts of data. It covers stacks, queues, linear, and linked lists using C. Trees, graphs, search, and sorting techniques also will be covered. Prerequisite(s): 90.267, or 90.212 and 90.364. Credits: 3 (3.0)

90.364 PROBLEM SOLVING WITH C

Intended as a practical problem-solving course, to give students further exposure to the topics covered in 90.267 and to provide the tools needed for software development. The course emphasizes these aspects of

the programming problem-solving process: problem specification and organization; algorithms, coding, debugging; the elements of good programming style; and the means of producing a high-quality finished product. Programming examples are chosen to span a wide range of both numeric and nonnumeric applications. Prerequisite(s): 90.212 or 90.267. Credits: 3 (3.0)

90.385 INTRODUCTION TO INFORMATION SECURITY (CYBER SECURITY)

This course will present an overview of the threats to your information technology infrastructure and intellectual property with an emphasis on the detection and prevention of intrusions or theft. The protection of services such as the World Wide Web, file sharing and email will be analyzed. The vulnerabilities and hardening of major operating systems such as Linux and Microsoft's Windows 2000 will be discussed. The course takes a holistic approach - discussing the technical but focusing on the need for proper training and procedures in the maintenance of an effective yet secure information technology infrastructure. While the material of the course is technical in nature, no systems administration or software development experience is assumed. Prerequisite(s): 90.160 and 90.202, or equivalent. Credits: 3 (3.0)

90.431 COMPUTER FORENSICS

Computer Forensics reviews forensic evidence and crime investigation, computer forensics and digital detective work, preparing for e-evidence collection and preservation, policies and procedures, data forensics, PDA forensics, cell phone forensics, forensic examination of computers (operating systems, common file system types, OSI and TCP/IP models) and digital (Windows, Linux, and Graphics files) and electronic media (e-mail and web-mail forensics), network forensics and intrusion detection, large-scale investigations, terrorism and virtual warfare and other types of Internet-based hositlities, botnets and criminal commerce, tracking criminals' trails, fraud and forensic accounting investigation, federal rules and criminal codes, and ethical and professional responsibility in testimony. In particular, the course introduces concepts essential to information security applications, legal foundation for understanding traditional and electronic evidence and evidence-handling procedures, technical knowledge and forensic examination of computers and electronic media, computer forensic procedures for successful investigations involving electronic evidence, a framework for understanding and investigating large-scale attacks, and federal rules of evidence and procedures that govern the admissibility of e-evidence and the testimony of expert witnesses. The course also introduces major legal, privacy, and ethical issues related to computing. Credits: 3 (3.0)

90.442 INTRODUCTION TO MICROSOFT® COM PROGRAMMING

This course is an introduction to creating applications that are implemented using Microsoft's Component Object Model (COM). The purpose of COM is to make it possible to develop large, complex software applications that are easily written, maintained, and revised. This is achieved by implementing the application as a collection of components, and using existing components whenever possible. COM is a specification that describes what a component (or object) is, how a component can manage its own lifetime, and how it tells the component world what it can do. COM Programming is the lynch pin of programming with Microsoft tools, such as Microsoft Transaction Server and COM+. This course opens the door to these technologies. Prerequisite(s): 90.269. Credits: 3 (3.0)

90.443 INTRODUCTION TO CLIENT/SERVER COMPUTING

An overview of what Client/Server is all about. The course will introduce the six leading technologies for developing Client/Server applications: database servers, TP (Transaction Processing) Monitors, middleware, groupware, distributed objects, and the Internet. Credits: 3 (3.0)

90.445 SQL DATABASE SERVERS

This course will examine the very popular database server model of Client/Server, covering SQL-92, SQL3, ODBC (Open DataBase Connectivity), DRDA (Distributed Relational Database Architecture), stored procedures, and triggers. It will also look at new database technologies such as data warehouses, OLAP (OnLine Analytical Processing), data mining and data replication. Prerequisite(s): 90.474. Credits: 3 (3.0)

90.448 ORACLE 10B PORTAL DEVELOPMENT

Oracle Portal creates the environment that provides the infrastructure to create Enterprise Portals rapidly being deployed in today's highly strategic business environment. Using the Oracle 10g Application Server Portal, this introductory course introduces students to the development and deployment capabilities of the Oracle 10g Portal framework. An introduction to the fundamentals of N-Tiered architecture, LDAP and SSO, Oracle-based HTTP server configuration and the Oracle 10g Application Server implementation on UNIX-based server architectures will be explored. Students will receive an in-depth view of key Oracle Portal features such as Portal Pages and Portlets development including building, populating and managing portal pages. They will also learn to add, organize, classify and deploy dynamic web content within the Oracle Portal. Prerequisite(s): Credits: 3 (3.0)

90.449 ORACLE 10G FORMS AND REPORTS

Oracle 10g forms/reports skills are essential for Oracle developers and are in high demand in today's competitive market. Using Oracle 10g development technology, students are provided a visual development environment to enable creation of sophisticated and user-friendly forms utilizing our state-of-the-art Oracle laboratory facility. The course is designed to instruct students to learn development of professional forms, reports, and graphs to address today's complex user requirements. The course further prepares students through the building of forms/reports templates, reusable components, form triggers, procedures, and integration, application debugging techniques and an introduction to the use of libraries. Students will also create tabular, master-detail, matrix and summary reports using the lab's Oracle 10g database. Exposure to the use of oracle 10g Forms/Reports server data block and layout wizards in addition to traditional use of PL/SQL for report and forms generation will also be introduced.Prerequisite: 90.459 or related experience.Credits: 3.0 Prerequisite(s): 90.459 or related experience. Credits: 3 (3.0)

90.450 DATABASE ADMINISTRATION I: INTRODUCTION TO ORACLE 10G

This course is designed to give the student an in-depth review of the Oracle DBMS architecture and physical components. The student is also introduced to common DBA skills to set up, maintain, and troubleshoot an Oracle 10g database. Students learn to leverage the 10g architecture to build and configure databases, manage database objects and logical/physical storage, configuration of Oracle processes and memory, manage user accounts, privileges and roles, and backup recovery strategy. Students also learn database organization including a comprehensive examination of Oracle's data dictionary, space management, table and index segments, undo and rollback segments, logical and physical block sizing, and key dynamic and static parameter files. Progressive hands-on labs utilizing the latest release of Oracle 10g Enterprise Server reinforces key concepts learned. Successful completion of this course prepares students for the Oracle Database Administration I certification exam and also qualifies as an oracle 10g DBA OCP Hands-On Approved Course. Credits: 3 (3.0)

90.453 DATABASE ADMINISTRATION II: ADVANCED ORACLE 10G

Building upon the skills students learned in Database Administration I, this course focuses on advanced concepts of managing enterprise-scale Oracle 10g databases. Students are introduced to advanced concepts used to analyze, troubleshoot, and resolve performance, backup and recovery, and configuration-related problems. Students closely examine Oracle 10g diagnostic, resource and data protection methodologies including interrogating dynamic and static system views, alert log, thresholds and traces, 10g flashback of critical/non-critical data, 10g automatic storage management, 10g automatic shared memory tuning, and 10g data pump import and export utilities. Students will also utilize the 10g Enterprise Manager Database and Grid Control web-based interface to perform advanced database maintenance and configuration Successful completion of this course prepares students for the Oracle Database Administration II certification exam and also qualifies as an oracle 10g DBA OCP Hands-On Approved Course. Prerequisite(s): 90.450 or related experience. Credits: 3 (3.0)

90.454 ORACLE 10G SQL DEVELOPMENT

This course provides students a practical, hands-on approach to working with the SQL language. Students will learn how to create and maintain database objects such as tables and indexes as well as to store, retrieve, and manipulate data on a host server. Students are introduced to simple and complex queries using standard SQL. Instructor-led hands-on labs utilizing Oracle's 10g Enterprise Database server will reinforce concepts learned throughout the course. This course will aid students in preparation for the Oracle Database Administration I certification exam and also qualifies as an Oracle's 10g DBA OCP Hands-On Approved Course. Prerequisite(s): Credits: 3 (3.0)

90.455 DATABASE ADMINISTRATION III: ORACLE 10G PROJECTS

Designed as a capstone course, students will build upon concepts learned in both Oracle Database Administration I and II. This course focuses on extensive hands-on skills building to enable students to gain practical Oracle Database Administration experience. Utilizing the latest release of Oracle 10g Enterprise Server, students hone their Oracle skills through problem analysis, troubleshooting, and performance and configuration resolutions in a variety of common 'real world' scenarios. Delivered completely via lab-based projects, primary focus is on identification and resolution of common problems involving server and database configuration, database performance, backup/recovery, and networking. This course documents student skills in preparation for employment as an Oracle Database Administrator as well as prepares students to sit for Oracle's Certified Master (OCM) hands-on lab. Prerequisite(s): 90.450 and 90.453, or instructor permission. Credits: 3 (3.0)

90.456 SECURITY ISSUES ON THE INTERNET

This course will survey e-espionage, e-business-to-business (b2b) information warfare, today's hacker versus yesterday's internet cracker, and the United States critical information highway. The ubiquitous nature of the "personal computer" as found in almost every agency, office and organization has created opportunities for e-terrorism, e-stalking and identity theft in conjunction with critical ethical issues that cross business lines. The course will follow a computer break-in and the investigation of clues left on the cracker's path through the twists and turns of computer cyberspace. Prerequisite(s): Junior standing or permission of instructor. Credits: 3 (3.0)

90.457 NETWORK SECURITY

This course explores the theory, mechanism, and implementation of security in computer networks. Our goal is to provide an introduction to mathematical encryption and security protocols, and how these are applied to the infrastructure of IP (Internet Protocol) Networks. We will cover Classical ciphers and cryptographic methods such as DES, 3DES, BLOWFISH, RC5, and Modern Public Key cryptography: RSA, Diffie-Hellman Exchange. The second half of the course will introduce the principles and implementation of IPSEC (IP Security), SSL (Secured Socket Layer), and PKI (Public Key Infrastructure). The mathematics required will be introduced in class. Prerequisite(s): 90.462 or related experience. Credits: 3 (3.0)

90.459 PL/SQL I: INTRODUCTION TO ORACLE 10G PL/SQL

This course will introduce students to the basics of PL/SQL subprograms. Students will learn how to write and invoke PL/SQL procedures, functions and packages. Using Oracle's 10g Enterprise Database Server, students will engage in hands-on lab work in both Oracle's Procedure Builder and SQL*Plus environments. Students will learn how to create and manage PL/SQL program units, database triggers, and common Oracle-supplied packages. This course will aid students in preparation for certification as an Oracle PL/SQL Developer Certified Associate and also qualifies as an Oracle's 10g DBA OCP Hands-On Approved Course. Credits: 3 (3.0)

90.460 COMPUTER ETHICS

This course is an introduction to the major issues surrounding the use of computers in our society, with a special focus on fields related to computer science and information technology management. The course will cover an analysis of major trends in emerging computer technology and their potential effects on work, leisure, government, and human relations. Students will examine the assumptions which underlie our culture's relation to technology and the relation between their own ethics and the values and ethics implicit in our uses of technology and information. Credits: 3 (3.0)

90.461 LAN/WAN TECHNOLOGIES

This course discusses basic data communication concepts; digital and analog signaling; media and cabling systems; the OSI reference model; Physical and Data Link layer; LAN standards; Ethernet, Token Ring, FDDI, Switched technologies, emerging LAN standards; Bridges and Routers; and Network operating systems. Prerequisite(s): 90.267 or previous programming experience. Credits: 3 (3.0)

90.462 TCP/IP AND NETWORK ARCHITECTURE

This course is study of the TCP/IP and Network Architecture. We will focus on the concepts and fundamental principles that have contributed to the modern networks design and implementation using TCP/IP. Topics to be addressed in this course are IP, ARP, RARP, and ICMP protocols; IP routing; TCP protocol; Telenet, FTP, SMTP; TCP/IP next-generation; OSI network protocols and standards; Client/Server networking and applications. Prerequisite(s): 90.461. Credits: 3 (3.0)

90.463 ADVANCED NETWORKING TECHNOLOGIES

Topics to be addressed in this course are Broadband ISDN and SONET concepts; Asynchronous Transfer Mode (ATM) basic principles; ATM Adaptation layer, ATM signaling; PNNI specifications; ATM physical interfaces; Switching ATM cells; ATM traffic management; LAN emulation and ATM migration; IP over ATM; IP switching; and Gigabit Ethernet. Prerequisite(s): 90.461. Credits: 3 (3.0)

90.464 NETWORK MANAGEMENT

Topics to be addressed in this course are Simple Network Management Protocol; SNMP-v2; RMON and RMON2; Enterprise management systems; OSI network management standards and development; CMIS and CMIP; Systems management; and emerging trends in network management. Prerequisite(s): 90.461 Credits: 3 (3.0)

90.465 FUNDAMENTALS OF INTERNETWORKING

Provides a clear understanding of internetworking technologies and how internetworks are implemented. This course will provide a knowledge foundation for the student who does not have prior experience with internetworking. Students will learn the concepts, terminology, and the components of an internetwork in depth and analyze actual data packets as they transit the network while relating the addressing information to the OSI model. The student will design and build two LANs and, as the course progresses, will interconnect the two LANs using a bridge and then a router. Prerequisite(s): 90.461 and 90.462, or working knowledge of LAN/WAN Technologies and TCP/IP Network Credits: 3 (3.0)

90.467 PL/SQL II: ADVANCED ORACLE 10G PL/SQL

This course introduces students to advanced features of PL/SQL used to design and interface with the Oracle 10g database. Students learn the benefits of Oracle 10g powerful extended PL/SQL functionality by exploring and utilizing advanced Oracle-supplied packages, procedures, REF cursors, extended interface methods, PL/SQL block debugging, case statement flows, bulk binds, code tuning considerations, and advanced object types. Students will engage in hands-on lab work using advanced techniques learned throughout the course to design PL/SQL applications that solve today's most complex business problems. This course will aid students in preparation for certification as an Oracle PL/SQL Developer Certified Associate. Prerequisite(s): 90.459. Credits: 3 (0.0)

90.474 RELATIONAL DATABASE CONCEPTS

Introduces database directives, design elements of databases, architectures, and commercial databases. Students will participate in design of a large-scale database application and administration of this database. Prerequisite(s): 90.267. Credits: 3 (3.0)

90.477 INFORMATION SYSTEMS I

This course serves as an introduction to Management Information Systems (MIS), emphasizing information needs at various management levels, including problem finding as well as problem solving. The course highlights the use of real time, distributed data processing, decision support and expert systems in the decision-making process of today's business. The student will understand how the use of different hardware and software can answer a wide range of 'what if' questions, crucial in today's planning function. Prerequisite(s): Junior status. Credits: 3 (3.0)

90.478 INFORMATION SYSTEMS II

Serves as a continuation of 92.477, stressing the systems approach of MIS, focusing on methodologies used and the control over MIS as it relates to other business areas. Case studies are used to unify preceding topics as they relate to corporate planning, marketing, manufacturing, accounting, finance and personnel subsystems. Prerequisite(s): 92.477. Credits: 3 (3.0)

90.480 PROJECT-BASED INFORMATION SYSTEMS

This course looks at information systems from the perspective of corporate management, rather than at a technical or programming level. It emphasizes how managers can successfully understand and use information systems in order to better realize company objectives, such as the revenue maximization, cost reduction, customer satisfaction, etc. Prerequisite(s): Junior status. Credits: 6 (3.0)

90.483 WIRELESS COMMUNICATIONS

This course provides a comprehensive introduction to mobile networks and services. This course covers advanced wireless and mobile network architectures, enabling technologies and protocols and the recent advances in mobile communication. Topics to be taught include: introduction to mobile network archi-

tectures, mobility management for different systems, network signaling for IS-41-based systems, PACS, GSM and CDMA, roaming procedures and international roaming, mobile number portability, third generation (3G) mobile systems, Wireless Local Loop, mobile IP and wireless enterprise networks. Topics such as broadband wireless, Wireless Application Protocol (WAP) and network operational management will also be covered. Course will have a project work to be completed in one of the hot areas of mobile networking. Prerequisite(s): 90.463 or a strong background in the area of telecommunications networking. Credits: 3 (3.0)

90.484 OPTICAL NETWORKING - SONET/SDH

This course provides an in-depth look at the Sonet and SDH Standards and applications applicable to the national and other international optical networks deployed by U.S. and international carriers. Introducing Sonet and SDH and their key attributes and benefits, the course provides a clear understanding of a Sonet/SDH End-to-End Optical Network component, the basic concept of a path, a line and a section and path, line and section terminating equipment (PTE, LTE and STE), including the optical interface specifications for a Sonet/SDH optical network. The course thus develops a background for the detailed understanding of the more advanced concepts included in this course - Sonet and SDH Signal Hierarchy (Rates, Formats and overheads); Sonet and SDH pointer applications (Mapping/Multiplexing); Sonet/SDH frame synchronization; Network Synchronization and Timing Recovery; Sonet/SDH Network Management - Performance Management, Fault Management, Configuration Management; Automatic Protection Switching (Linear and Ring). Prerequisite(s): 90.463 or instructor permission. Credits: 3 (3.0)

90.486 MULTIPROTOCOL LABEL SWITCHING (MPLS)

MPLS Fundamental Concepts; Enhancing Routing Functionality with MPLS; MPLS and QoS Support; Implementing Layer 2 and Layer 3 VPNs with MPLS; MPLS in the Metro; MPLS in the Access; Voice over MPLS. Prerequisite(s): 90.462. Credits: 3 (3.0)

91.113 EXPLORING THE INTERNET

This course focuses on the primary tools used to navigate the Internet from a Windows desktop: e-mail and the web browsers. In addition, this course covers many of the other applications of the Internet: ftp, listserve, newsgroups, chat, search engines, and portals. Students will complete hands-on exercises, including construction of their personal web page.Not for computer science majors. Credits: 3 (3.0)

91.201 COMPUTING III

Object-oriented programming. Classes, methods, polymorphism, inheritance. Object-oriented design. C++. UNIX. Ethical and social issues. Prerequisite(s): 91.102. Credits: 4 (3.0)

91.250 DATA STRUCTURES USING C++

This is an accelerated C++ programming experience with an emphasis on data structures and a descriptive treatment of algorithms. This course will assist those students who may have had some exposure to programming in another language or who perhaps need a more formal explanation of the C++ programming language. A descriptive treatment will be given of algorithms which manipulate data structures such as trees, graphs, stacks, and queues.Not for computer science majors. Prerequisite(s): Some previous programming experience. Credits: 4 (3.0)

91.301 ORGANIZATION OF PROGRAMMING LANGUAGES

Analytical approach to the study of programming languages. Description of the salient features of the imperative, functional, logical, and object-oriented programming paradigms in a suitable metalanguage such as Scheme. Topics include iteration, recursion, higher-order functions, types, inheritance, unification, message passing, orders of evaluation, and scope rules. Elementary syntactic and semantic descriptions. Implementation of simple interpreters. Prerequisite(s): 91.250 or equivalent; requires Graduate Coordinator permission. Credits: 3 (3.0)

91.304 FOUNDATIONS OF COMPUTER SCIENCE

A survey of the mathematical foundations of Computer Science. Finite automata and regular languages. Stack Acceptors and Context-Free Languages. Turing Machines, recursive and recursively enumerable sets. Decidability. Complexity. This course involves no computer programming. Prerequisite(s): 92.322. Credits: 3 (3.0)

91.305 COMPUTER ARCHITECTURE

Examines the basic functional components of a computer system including the CPU, memory systems, and I/O systems. Each of these three areas will be developed in detail with a focus on the system design and component integration. Topics will include CPU control and ALU operation, computer timing, data address and I/O bus activity, addressing model, programmed and DMA I/O, and instruction sets and micro code. Prerequisite(s): 91.250 or equivalent; requires Graduate C.S. Coordinator permission. Credits: 3 (3.0)

91.308 OPERATING SYSTEMS

Presents an introduction to major operating systems and their components. Topics include processes, concurrency and synchronization, deadlock, processor allocation, memory management, I/O devices and file management, and distributed processing. Techniques in operating system design, implementation, and evaluation will be examined. Prerequisite(s): 91.305, 91.250 or equivalent; requires Graduate Coordinator permission. Credits: 3 (3.0)

91.404 ANALYSIS OF ALGORITHMS

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, graphs, arrays; algorithms design strategies; backtracking, greedy storage, divide and conquer, branch and bound. Elementary techniques for analysis; recursion equations, estimations methods, elementary combinatorial arguments. Examination of problem areas such as searching, sorting, shortest path, matrix and polynomial operations, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses

to solve a number of logically complex programming problems. Prerequisite(s): 91.201, 92.322; requires Graduate C.S. Coordinator permission. Credits: 3 (3.0)

92.111 QUANTITATIVE REASONING

An introduction to the mathematics concepts and skills important in modern society, even for non-technical pursuits. The course will emphasize conceptual understanding as well as a facility in performing elementary computations. Topics to be examined will include types of reasoning, problem-solving methods, techniques of estimation, algebraic essentials, and the nature of probability and statistics.No credit in Science or Engineering. Prerequisite(s): Two years of high school algebra; Liberal Arts majors only. Credits: 3 (3.0)

92.120 PRECALCULUS MATHEMATICS I (ET/IT)

Intended for students whose background in basic algebra is current. The course objective is to provide students with problem solving and computational techniques needed for further course work and in their occupation. Topics covered include: linear equations, slope of a line, quadratic equations, functions, transformations, inequalities, curve sketching, systems of equations, and the exponential and logarithmic functions 3 credit(s) Prerequisite: 90.11 or equivalent or satisfactory score on the Math Placement Exam given the first week of class. Credit is given for only one of the three following courses; 90.119 , 92.120 or 92.121. Prerequisite(s): 90.111 or equivalent or satisfactory score on the Math Placement Exam given the first week of class. Credits: 3 (0.0)

92.121 MANAGEMENT PRECALCULUS

Review of algebra: operations on the real numbers, factoring, radical notation, and rational exponents. Linear and quadratic equations, rational expressions. Graphs of functions, straight lines, parabolas, exponential and log functions, systems of equations, and linear mathematical models. Prerequisite(s): No credit for math/science/engineering majors. Credits: 3 (3.0)

92.122 MANAGEMENT CALCULUS

Differential calculus: limits, continuity, derivatives, differentials, higher-order derivatives, implicit differentiation, maxima and minima of functions, and applications of derivatives to business and economics. Integrals and Applications to business.No credit in Science or Engineering. Prerequisite(s): 92.119 or 92.120 or equivalent; not for science or engineering majors. Credits: 3 (3.0)

92.123 PRECALCULUS MATHEMATICS II

Reviews angles and their measure, the trigonometric functions, solving triangles, law of sines, law of cosines, circular functions and their graphs, vectors and trigonometric identities. Prerequisite(s): 92.120. Credits: 3 (3.0)

92.124 PRECALCULUS FOR SCIENCE AND ENGINEERING

Reviews some high school mathematics for prospective calculus students. The following topics are included: fractions, exponents and radicals, relations, functions, and graphs; exponential and and logarithmic functions; trigonometry and the trigonometric functions; imaginary and complex numbers; polynomials and rational functions; the conic sections. Successful completion of this course with a grade of C or better will give students credit for 92.121 and 92.123. Prerequisite(s): Recent knowledge of high school Algebra II. Credits: 3 (3.0)

92.125 CALCULUS A

Serves as a first course in calculus and provides a brief review of analytic geometry and trigonometric functions. The course progresses to the study of inverse functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental functions, chain rule, implicit differentiation, linear approximation, differentials, and maximum and minimum values. Prerequisite(s): 92.123. Credits: 3 (1.0)

92.126 CALCULUS B

Serves as a continuation of 92.125. The course covers L'Hopital's Rule, optimization problems, Newton's method, sigma notation, integration, area between curves, volume, arc length, surface area, integration by parts, trigonometric substitution, partial fraction decomposition, and improper integrals. Prerequisite(s): 92.125. Credits: 3 (3.0)

92.127 PREPARATION FOR CALCULUS

Presents a review of precalculus algebra and trigonometry integrated with the first half of Calculus I. Functions, limits, continuity, the derivative, the chain rule, related rate problems. For technical degree programs, including Mathematics, only two credits of this course may be applied toward a degree.No credit in Science or Engineering. Credits: 4 (4.0)

92.131 CALCULUS I

Serves as a first course in calculus. Functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, related rate problems, max/min problems, and curve sketching. Integrals and areas. Credits: 4 (4.0)

92.131 CALCULUS I

Serves as a first course in calculus. Functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, related rate problems, max/min problems, and curve sketching. Integrals and areas. Credits: 4 (0.0)

92.132 CALCULUS II

Serves as a continuation of Calculus I. Volume, arc length, surface area, pressure and force. Differentiation and integration of trigonometric, inverse trigonometric, exponential, logarithmic, and hyperbolic functions. Improper integration, infinite series, Taylor and MacLauren series. Prerequisite(s): 92.131. Credits: 4 (4.0)

92.151 EXPLORATIONS IN MATHEMATICS

An introduction to the nature of mathematics, providing insights into what mathematics is, what it accomplishes, and how it is pursued as a human enterprise. The course will stress concepts and relevance to modern experience, with topics to be selected at the dis-

cretion of each instructor from a wide variety of interesting and illustrative fields of mathematics. No credit in Science or Engineering. Prerequisite(s): Liberal Arts majors only. Credits: 3 (3.0)

92.221 LINEAR ALGEBRA I

Elementary set theory and solution sets of systems of linear equations. An introduction to proofs and the axiomatic methods through a study of the vector space axioms. Linear analytic geometry. Linear dependence and independence, subspaces, basis. Inner products. Matrix algebra. Applications of the above will also be discussed. Prerequisite(s): 92.225 and 92.321 or permission of coordinator. Credits: 3 (3.0)

92.222 LINEAR ALGEBRA II

Linear transformations. Linear operators, change of basis, inner product and the diagonalization problem. Quadratic forms. Convex sets and geometric programming, input/output models for an economy, Markov chains, other applications of linear algebra. Prerequisite(s): 92.221. Credits: 3 (3.0)

92.225 CALCULUS C

Serves as a continuation of 92.126. This course covers integration by parts, integration of trigonometric integrals, trigonometric substitution, partial fraction, numeric integration, improper integrals, L'Hopital's Rule, indeterminate forms, sequences, infinite series, integral tests, comparison tests, alternating series tests, power series, Taylor series, polar coordinates, graphs and areas in polar coordinates, and parametric equations. Prerequisite(s): 92.126. Credits: 3 (3.0)

92.226 CALCULUS D

Serves as a continuation of 92.225. This course covers curvature, cylindrical surfaces, dot and cross products, curves and planes in three space, cylindrical and spherical coordinates, functions of two variables, chain rule, directional derivatives and gradient, tangent planes, and double and triple integrals in rectangular, polar, cylindrical and spherical coordinate systems. Prerequisite(s): 92.225. Credits: 3 (3.0)

92.231 CALCULUS III

Serves as a continuation of Calculus II Polar Coordinates, parametric equations, vectors and analytic geometry in space. Functions of several variables, partial derivatives, and chain rule. Tangent planes and normal lines. Maxima and minima, Lagrange multipliers, and multiple integrals. Prerequisite(s): 92.132. Credits: 4 (4.0)

92.234 DIFFERENTIAL EQUATIONS

Classification and solution of ordinary differential equations of the first order and higher orders. The Laplace transform. Applications. Prerequisite(s): 92.225 or 92.132. Credits: 3 (3.0)

92.236 ENGINEERING DIFFERENTIAL EQUATIONS

Introduction to differential equations with an emphasis on engineering applications. Topics include first-order equations, higher-order linear equations with constant coefficients, and systems of first-order equations. Applications of each topic are introduced and qualitative, analytical, and numerical solution techniques are studied. Laplace transform methods are discussed. The software package MATLAB may be used throughout the course. Prerequisite(s): 92.225 or 92.132. Credits: 3 (3.0)

92.283 INTRODUCTION TO STATISTICS

An introduction to descriptive statistics, graphing and data analysis, probability laws, discrete and continuous probability distributions, correlation and regression, inferential statistics. No credit for Math, Science, or Engineering majors. Prerequisite(s): 92.120 or equivalent. Credits: 3 (3.0)

92.301 INTRODUCTION TO APPLIED MATHEMATICS I

Discusses vector analysis, Green's Theorem, Divergence Theorem, Stokes' Theorem, Fourier series, integrals, and partial differential equations of physics and engineering. Prerequisite(s): 92.226 or 92.231. Credits: 3 (3.0)

92.302 INTRODUCTION TO APPLIED MATHEMATICS II

Introduces students to matrix algebra, solution of systems of linear equations, eigenvalues and eigenvectors, solution of differential equations by matrix methods, series solution of differential equations, Bessel and Legendre functions, and Sturm-Liouville problems. Prerequisite(s): 92.236. Credits: 3 (3.0)

92.310 INTRODUCTION TO CHAOS AND DYNAMICAL SYSTEMS

Introduces students to some of the spectacular developments in the new science of chaos by studying the field of mathematics known as dynamical systems. Students will do computer experiments and write up lab reports. Topics covered include: orbits, graphical analysis, periodic points, bifurcations, quadratic family, transition to chaos, symbolic dynamics, Chaos, Sarkovskii's theorem, Schwarzian derivative, fractals, Julia sets, and the Madelbrot set. Prerequisite(s): 92.231. Credits: 3 (3.0)

92.321 DISCRETE STRUCTURES I

Presents propositional logic, combinatorics, methods of proof, mathematical systems, algebra of sets, matrix algebra, relations and functions, recursion and generating functions, applications to computer science, and graph theory. Prerequisite(s): 90.112 or 92.120. Credits: 3 (3.0)

92.322 DISCRETE STRUCTURES II

Examines graph theory, trees, algebraic systems, Boolean algebra, groups, monoids, automata, machines, rings and fields, applications to coding theory, logic design, and sorting. Prerequisite(s): 92.321. Credits: 3 (3.0)

92.362 NUMERICAL ANALYSIS I

Focuses on the theory and application of numerical techniques including error analysis. Also discusses solution of linear, nonlinear and differential equations, interpolation, numerical integration, and curve fitting. Computer solutions are emphasized. Prerequisite(s): 92.225 or 92.231, 92.236 and a knowledge of one programming language. Credits: 3 (3.0)

92.363 INTRO TO DATA ANALYSIS

Computer analysis of data derived from research conducted in physical, social, and life sciences. Data preparation. Data modification, file manipulation, and descriptive statistics using SPSS. Programming ability is not required. No credit in Science or Engineering. Prerequisite(s): 92.283 or equivalent. Credits: 3 (3.0)

92.375 SENIOR SEMINAR I

Students work with an advisor to develop a proposal for a senior project that will be carried out as part of 92.475 Senior Seminar II. Generally taken during the spring of the junior year. Prerequisite(s): Permission of math coordinator, Senior Status Math majors. Credits: 1 (0.0)

92.385 APPLIED STATISTICS

Introduction to experimental design, data analysis and formal statistical procedures from an applied point of view. Prerequisite(s): 92.126. Credits: 3 (3.0)

92.386 PROBABILITY AND STATISTICS I

Provides a one-semester course in probability and statistics with applications in the engineering sciences. Probability of events, discrete and continuous random variables cumulative distribution, moment generatory functions, chi-square distribution, density functions, distributions. Introduction to estimation, hypothesis testing, regression and correlation. Prerequisite(s): 92.225 or 92.132. Credits: 3 (3.0)

92.407 PROBABILITY AND MATHEMATICAL STATISTICS I

Addresses the topics of probability, random variables, discrete and continuous densities, expectation and variance, special distributions (binomial, Poisson, normal, etc.), moment generating functions, joint and conditional distributions, transformations of variables, sampling, and the central limit theorem. Prerequisite(s): 92.126 or 92.132 or equivalent. Credits: 3 (3.0)

92.408 PROBABILITY AND MATHEMATICAL STATISTICS II

Discusses point estimation and confidence intervals, sufficiency, efficiency, Fisher's Lemma, Cramer-Rao bound, hypothesis testing, correlation, linear regression, analysis of variance for the one- and two-way design, non parametric methods, chi-square tests for contingency tables. Prerequisite(s): 92.386 or 92.407. Credits: 3 (3.0)

92.410 COMPUTERS AND CALCULATORS IN THE CLASSROOM

This course explores the roles of mainframes, PCs and hand calculators in instruction, examine some of the available software and consider their use in a variety of areas of secondary mathematics, such as algebra, geometry (Euclidean and analytic), probability and statistics and introductory calculus.No credit in Science or Engineering. Credits: 3 (3.0)

92.411 COMPLEX VARIABLES I

Discusses complex numbers, functions of a complex variable, mappings, derivatives, analytic functions, elementary functions. Laurent series, residues and poles, contour integration. Prerequisite(s): 92.226 or 92.231. Credits: 3 (3.0)

92.412 COMPLEX VARIABLES II

Examines transformations, conformal mappings, boundary conditions, applications in heat conduction, electrostatic potential, and fluid flow, gamma and beta functions, Inverse Laplace transform, and Riemann surfaces. Prerequisite(s): 92.411. Credits: 3 (3.0)

92.413 NUMBER THEORY

Studies congruencies and the Chinese Remainder Theorem, Primitive roots, quadratic reciprocity, approximation properties of continued fractions, Pell's equation. Recent application of number theory such as primality testing, cryptology, and random number generation will also be covered. Prerequisite(s): 92.221 or 92.321. Credits: 3 (3.0)

92.419 INTRODUCTION TO MATHEMATICA

A project -based course starting with an introduction to the basic features of Mathematica. A project that allows the student to focus on certain features in more detail is required and occupies the second half of the course. Prerequisite(s): Two semesters of calculus and one semester of programming. Credits: 3 (3.0)

92.420 MATHEMATICAL PROBLEM SOLVING

Focuses on: mathematical resources, ability to use heuristics, the student's beliefs about the use of mathematics to solve problems, and the student's self-confidence as a problem solver. Effective strategies for incorporating problem solving in the curriculum will also be discussed. Prerequisite(s): 92.221 or 92.321. Credits: 3 (3.0)

92.421 ABSTRACT ALGEBRA I

Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homomorphisms, applications. Prerequisite(s): 92.221 or 92.321. Credits: 3 (3.0)

92.427 GEOMETRY

Provides a wide survey of topics related to secondary school geometry; axiomatic systems and Euclidean geometry; constructions in geometry; analytic geometry; and introduction to Noneuclidean geometry. Prerequisite(s): 92.221 or 92.321. Credits: 3 (3.0)

92.435 HISTORY OF MATHEMATICS

Examines ancient numeral systems, Babylonian and Egyptian mathematics, Pythagorean mathematics, duplication, trisection, and quadrature, Euclid's Elements and Greek mathematics after Euclid, Hindu and Arabian mathematics, European mathematics from 500 to 1600, origins of modern mathematics, analytic geometry, the history of calculus. Also covers the transition to the twentieth century and contemporary perspectives. Prerequisite(s): Three semesters of calculus. Credits: 3 (3.0)

92.448 MATHEMATICS OF SIGNAL PROCESSING

Representation of Signals: Fourier analysis, fast Fourier transforms, orthogonal expansions. Transformation of signals: linear filters, modulation. Band-limited signals. Sampling. Uncertainty principle. Windows and extrapolation. Applications to medical imaging and array processing. Prerequisite(s): 92.234/221. Credits: 3 (3.0)

92.450 MATHEMATICAL MODELING

Applications of mathematics to real life problems. Topics include dimensional analysis, population dynamics wave and heat propagation, traffic flow. Prerequisite(s): 92.234. Credits: 3 (3.0)

92.454 NUMERICAL ANALYSIS II

Serves as a continuation of 92.362 including: numerical solution of ordinary and partial differential equations, boundary value problems, curve-fitting, error analysis and computer solutions. Prerequisite(s): 92.362. Credits: 3 (3.0)

92.466 STATISTICAL PROGRAMMING USING SAS

An introduction to creation and manipulation of databases and statistical analysis using SAS software. SAS is widely used in the pharmaceutical industry, medical research and other areas. Prerequisite(s): 92.386 or equivalent. Credits: 3 (0.0)

92.475 SENIOR SEMINAR II

Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics. Prerequisite(s): Senior Status Math majors. Credits: 3 (3.0)

92.476 SENIOR SEMINAR III

An optional second semester seminar to allow for continuation of study initiated in Senior Seminar II. Prerequisite(s): 92.475. Credits: 3 (3.0)

92.486 PROBABILITY AND MATH STATISTICS II

Point estimation, confidence intervals, hypothesis testing. Two-sample t-test. Correlation and linear regression. The bivariate normal distribution. Analysis of variance for one-and two-way designs. F tests. Nonparametric methods. Chi-squared tests for contingency tables. Generalized likelihood ratio. C.R. bound. Consistency. Prerequisite(s): 92.386. Credits: 3 (3.0)

92.488 STATISTICAL QUALITY CONTROL

Introduction to statistical methods useful in quality assurance. Theory and application of control charts for variables and attributes. Process capability analysis. Acceptance sampling. Introduction to reliability/survival analysis. Prerequisite(s): 92.386 or equivalent. Credits: 3 (3.0)

92.491 DIRECTED STUDY IN ALGEBRA

Individual study for the student desiring more advanced or more specialized work in algebra. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite(s): Permission of Department Coordinator. Credits: 3 (3.0)

92.492 DIRECTED STUDY IN ANALYSIS

Individual study for the student desiring more advanced or more specialized work in analysis. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite(s): Permission of Department Coordinator. Credits: 3 (3.0)

94.301 ORGANIZATION OF PROGRAMMING LANGUAGES

Analytical approach to the study of programming languages. Description of the salient features of the imperative, functional, logical, and object-oriented programming paradigms in a suitable metalanguage such as Scheme. Topics include iteration, recursion, higher-order functions, types, inheritance, unification, message passing, orders of evaluation, and scope rules. Elementary syntactic and semantic descriptions. Implementation of simple interpreters. Prerequisite(s): Requires Graduate Computer Science Coordinator permission. Credits: 3 (0.0)

94.305 COMPUTER ARCHITECTURE

Examines the basic functional components of a computer system including the CPU, memory systems, and I/O systems. Each of these three areas will be developed in detail with a focus on the system design and component integration. Topics will include CPU control and ALU operation, computer timing, data address and I/O bus activity, addressing model, programmed and DMA I/O, and instruction sets and micro code. Prerequisite(s): Requires Graduate Computer Science Coordinator permission. Credits: 3 (0.0)

94.308 INTRODUCTION TO OPERATING SYSTEMS

Presents an introduction to major operating systems and their components. Topics include processes, concurrency and synchronization, deadlock, processor allocation, memory management, I/O devices and file management, and distributed processing. Techniques in operating system design, implementation, and evaluation will be examined. Prerequisite(s): Requires Graduate Computer Science Coordinator permission. Credits: 3 (0.0)

94.404 ANALYSIS OF ALGORITHMS

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, graphs, arrays; algorithms design strategies; backtracking, greedy storage, divide and conquer, branch and bound. Elementary techniques for analysis; recursion equations, estimations methods, elementary combinatorial arguments. Examination of problem areas such as searching, sorting, shortest path, matrix and polynomial operations, and the indicated representations and algorithms. The student will use the tech-

niques learned in this course and in previous courses to solve a number of logically complex programming problems. Prerequisite(s): Requires Graduate Computer Science Coordinator permission. Credits: 3 (0.0)

95.103 GENERAL PHYSICS I

Serves as the first semester of a one-year course which surveys the field of physics at a non-calculus level. Topics include force and motion, vectors, gravity, energy and momentum, heat and thermodynamics, and oscillations, waves and sound. Although the course emphasizes conceptual understanding, a functional knowledge of algebra and geometry is essential. Prerequisite(s): Corequisite: 96.103. Credits: 3 (3.0)

95.104 GENERAL PHYSICS II

Provides a continuation of 95.103. Topics include electricity and magnetism, geometrical and physical optics, atoms, and nuclei. Prerequisite(s): 95.103. Corequisite: 96.104. Credits: 3 (3.0)

95.141 PHYSICS I

First semester of a two-semester sequence for science and engineering majors. Mechanics including vectors, kinematics in one and two dimensions, Newton's laws of dynamics, work and energy, energy conservation, linear momentum conservation, rotational kinematics and dynamics, Newton's Universal Law of Gravitation, oscillatory motion and mechanical waves. Prerequisite(s): Corequisites: 92.131, 96.141. Credits: 3 (4.0)

95.144 PHYSICS II

Continuation of 95.141. Optics including interference, and diffraction. Electricity and magnetism including Coulomb's Law, electric field, Gauss' Law, electric potential, Ohm's law, DC circuits with resistors, magnetic field, Ampere's Law, Faraday's Law, inductance, Maxwell's equations, and electromagnetic waves. Modern physics including deBroglie waves, uncertainty principle, photoelectric effect, hydrogen atom and the stability of the Bohr orbits, and atomic spectrum of hydrogen. Prerequisite(s): 95.141. Corequisites: 92.132, 96.144. Credits: 3 (4.0)

96.103 GENERAL PHYSICS I LAB

Presents the first semester of a one-year course which surveys the field of experimental physics with topics correlated to the corequisite lecture course. Prerequisite(s): Corequisite: 95.103 or 95.201. Credits: 1 (2.0)

96.104 GENERAL PHYSICS II LAB

Serves as a continuation of 96.103 with topics correlated with the corequisite lecture course. Prerequisite(s): 96.103. Corequisite: 95.104 or 95.202. Credits: 1 (2.0)

96.141 PHYSICS I LAB

Serves as an introductory course on methods and techniques of experimentation in physics with experiments in mechanics selected to support the concepts of the corequisite lecture course. Prerequisite(s): Corequisite: 95.141. Credits: 1 (2.0)

96.144 PHYSICS II LAB

Serves as a continuation of 96.141 with experiments in optics, electricity and magnetism, and modern physics to support the concepts of the corequisite lecture course. Prerequisite(s): 96.141. Corequisite: 95.144. Credits: 1 (1.5)

99.101 RADIATION AND LIFE

This course will provide students with an understanding of the nature, sources, uses, and biological effects of natural and man-made radiations. Radiations discussed include non-ionizing radiations such as ultraviolet and microwave as well as the ionizing radiations produced by radon in homes and radio nuclides released from nuclear power plants. Students will have a better understanding of the risks and benefits of radiation in the modern world.Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors. Prerequisite(s): Corequisite: 99.102. Credits: 3 (3.0)

99.102 RADIATION AND LIFE LABORATORY

This laboratory course which is suitable for non-science majors will provide the student with an opportunity for some hands-on experience with modern equipment used to identify and quantify levels of radioactivity in the environment. Students will measure radiation from a variety of sources and will determine concentrations of radionuclides in several environmental samples including making measurements of the radon levels in the air of their own homes. Students will also study the effects of ionizing radiation on the germination and growth rate of exposed seeds.Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors. Prerequisite(s): Corequisite: 99.101. Credits: 1 (2.0)

99.131 TECHNICAL PHYSICS I

Presents material in both the class and laboratory format. Topics include: vectors; one- and two- dimensional motion; Newton's laws of motion; translational and rotational equilibrium; work and energy; linear momentum; and circular motion and gravitation. Two additional Friday night classes are required. Prerequisite(s): C: 92.125. Credits: 3 (3.5)

99.132 TECHNICAL PHYSICS II

Covers material in both the class and laboratory format. Rotational dynamics; mechanical vibrations and waves; sound; solids and fluids; thermal physics; heat and law of thermodynamics will be discussed. One session per week. Two additional Friday night classes are required. Prerequisite(s): 99.131. Credits: 3 (3.0)

99.133 TECHNICAL PHYSICS III

Presents material in both the class and laboratory format. Reflection, refraction, mirrors, lenses, wave optics, optical instruments, Coulomb's law, magnetic force, quantum physics, atomic physics and nuclear physics will each be addressed. One session per week. Two additional Friday night classes are required. Prerequisite(s): 99.132. Corequisite: 92.126. Credits: 3 (3.0)

course descriptions

continuing studies

at a glance

Frequently Asked Questions

Q What's the difference between application into a program and registering for a course?

A. Anyone can register for a course, provided they meet that course's specific prerequisites. Students who wish to pursue a degree or certificate program must apply for admission to a program through the Admissions Office at the University. For more information on applying into a degree program, see page 39. See page 93 for information on applying into a certificate program.

Q What is ISIS?

A. Our Intercampus Student Information System (ISIS) enables students to access their academic courses and financial records, as well as register for courses, via the web. The student will receive a User ID (UMS--------) and be able to create a password. For assistance with ISIS, students can contact the HELP Desk:

http://help.uml.edu
help@uml.edu
(978) 934-HELP (4357)

Q How can I access my grades?

A. Grade reports are no longer mailed to the students. Students must log onto the ISIS student information system to view their transcripts. University policy does not allow grades to be given over the phone. Students may request official transcripts using the ISIS system.

Q How do I register for a course?

A. Using the ISIS online registration system:

1. Click "Academics"
2. Click "Enroll in a Class"
3. Select the Term
4. Click "Add Classes"
5. Type the Class Number in the Class Number field. Note: The Class Number is different from the Course Number.If you do not know the Class Number you can click on the magnifying glass to search by Course Number. Click the Check Mark next to the section you desire to add that course to your schedule.
6. Repeat Step 5 until all desired classes have been added
7. Click "Submit"

Q How do I register for an online course?

A. Please use the same ISIS process as outlined in the previous question. Be sure to provide your email address when you register. For more information on how to register, visit our website. Before the semester begins go to the UMass Lowell online course website at http://continuinged.uml.edu/online and get your online course username and password. You can usually do so about two weeks before the start of each semester. When you do this, you will receive your username, password, and class URL. If your username/password does not work, please call (978) 934-2467.

Q I'm not a US citizen; can I still take classes?

A. Yes. Please visit http://continuinged.uml.edu for more information. For more information regarding international students, please contact Anne Dean at Anne_Dean@uml.edu.

Q Are Career Services available?

A. For students enrolled in a certificate or degree program, the Office of Career Services is available for advice and assistance. Please see their web page at http://ocs.uml.edu.

Q How do I obtain Financial Aid?

A. Please refer to pages 13-15, or call the Financial Aid Office at (978) 934-4220 for assistance.

Q What is the refund policy?

A. Students withdrawing from any class must officially do so using the ISIS online registration system. To withdraw from a class, follow the registration procedure outlined in Question #4 and select "DROP". Verbal messages to faculty or staff do not constitute official notification.

Please contact the University's Accounts Receivable Department at (978) 934-3570 for the latest tuition refund information. For additional information on withdrawal deadlines and final ADD/DROP dates, visit our registration page http://continuinged.uml.edu/general/registration.htm

Q How can I get a copy of my transcripts?

A. Using the ISIS student information system students can view and print a copy of their transcripts. Students may use the ISIS system to request official transcripts, which will be mailed to the address(es) indicated. There is no charge for official transcripts.

Q I don't live in MA; will I be charged a higher out-of-state tuition?

A. Tuition is the same for Continuing Studies students whether you live in Massachusetts or out of the state.

Q How do I transfer credits into a degree program?

A. An official copy of your transcripts must be received at the Office of Undergraduate Admissions at the following address:

Office of Undergraduate Admissions
University of Massachusetts Lowell
883 Broadway Street, Room 110
Lowell, MA 01854-5104

This may be mailed directly from your previous college/university or you may deliver/mail your official transcripts in a sealed envelope. You should also make sure you have completed and submitted an application form into your program of choice. A program coordinator then evaluates and determines which credits will transfer. A letter of acceptance and a transfer evaluation worksheet will be sent to you.

Students who have earned credits outside the U.S. will want to contact the Center for Educational Documentation to have their credits evaluated for potential transfer credit. You can reach them at info@cedevaluations.com or by phone at 617-338-7171. Their web address is www.cedevaluations.com. Their mailing address is:

Center for Educational Documentation, Inc.
PO Box 231126
Boston, MA 02123-1126

Q Do I have to enroll in a degree or certificate to take CSCDE classes?

A. A person does not have to be in a program to take courses.

Q Can I email my request to drop or withdraw?

A. No. You must drop or withdraw from your courses using the Intercampus Student Information System (ISIS).

Q. What types of library resources does UMass Lowell have?

A. The University library system consists of an extensive Electronic Library as well as facilities at three locations: the O'Leary Library, Lydon Library, and the Center for Lowell History at the Mogan Center. See page 18 for more information.

Q. How do I get a student ID and parking sticker?

A. Students matriculated in a degree or certificate program are issued access cards. New parking stickers are required for all Continuing Studies students. The Parking Registration form is available at http://www.uml.edu/access-services/. This sticker entitles students to park after 5:30pm in a University parking lot except Cumnock Hall. Student and faculty cars will be towed and/or ticketed for violations. In addition, the Lowell Police will tow student and faculty cars if parked in "Residential Parking" areas. Please call the Student and Faculty Support Center at (978) 934-2474 for the location of parking lots available for use by Continuing Studies students who visit the campus during the day.

Q. What are the hours of the Campus Security Safety Shuttle Service?

A. UMass Lowell's Campus Security Safety Shuttle Service will escort students, faculty, and staff anywhere on campus. You may call (978) 934-2222 to ask for escort service at the following locations: Fox Hall Main Lobby, Sheehy/Concordia Link, Eames Hall Main Lobby, University Bus Stops, All Parking Lots (flash your lights and they will pick you up). For hours of operation, visit http://www.uml.edu/student-services/transportation_services

Q. Who is eligible for tuition remission?

A. Veteran's Information: Veterans must be matriculated in an undergraduate degree or certificate program and have all appropriate paperwork on file in Enrollment Services/Continuing Studies, Corporate and Distance Education, including a DD214, an Admission Application form, and Proof of Residency in order to receive VA benefits. Tuition waivers are available to veterans who are legal residents of Massachusetts for more than 12 consecutive months, and Proof of Residency must be updated annually. These waivers for legal Massachusetts residents (residency must be documented) cover 100% cost of tuition, are not retroactive, and do not cover registration fees and other fees. Veterans requesting benefits must check the appropriate line on the registration form. Veterans should use the mail-in or walk-in options when registering and should provide all necessary documentation (information not accepted by phone). For additional information, call Linda Morabito at (978) 934-2461.

Veterans' waivers are available for on-campus courses provided there is a sufficient number of tuition-paying students enrolled to bear the cost of instruction and provided there is space available. Due to the high cost of online and off-campus courses, there are no waivers available for these courses. Merit and Need-Based Assistance Grants for online courses may be available to veterans who are presently enrolled in degree and certificate programs and who are making satisfactory academic progress towards their degrees or certificates.

Senior Citizens: Massachusetts residents who are Senior Citizens (60 years or older) may attend classes in Continuing Studies credit programs tuition-free provided that there are sufficient tuition-paying students enrolled to bear the cost of instruction and provided there is space available. Please note that waivers are not retroactive and do not cover registration fees and other fees. Proof of Massachusetts residency and birth date must be provided at the time of registration. However, due to the high cost of online courses, there are no waivers available for these courses. For additional information call (978) 934-2588.

Third-Party Payment: All students using company direct payments or military plans must include the appropriate authorizing letters with their registration. No retroactive tuition refund is awarded for late submission of eligibility form. Students receiving company reimbursement must prepay their own tuition.

Q. Can you fax me a course description?

A. Yes, however, it is usually more convenient to access the course descriptions off the website http://continuinged.uml.edu/.

Q. What are certificate programs?

A. Continuing Studies' certificate programs are short-term, credit programs of study that are designed to run at a student's own pace. Students must apply to the certificate program, but, registration for the courses is on a semester-to-semester basis. There is no set cost for a particular certificate program, rather, costs are determined per credit per course each semester. Once a student has completed the necessary courses in a certificate he/she must fill out a certificate award petition. In about 4-6 weeks the certificate should be mailed to them. Students enrolled in a certificate program can receive financial aid; please call the Financial Aid Office at (978) 934-4220. Also, students enrolled in an undergraduate certificate program can transfer one course from another university into the certificate, if approved by the coordinator. In order to do this, a student must submit a petition form to Continuing Studies. Substitution of courses may be possible if approved by the certificate coordinator. The student must submit a petition form and get approval prior to taking the course.

Q. What services are available for learning and physically disabled students?

A. The University and its programs and activities are becoming increasingly more accessible to academically qualified students who are physically or learning disabled. Although some architectural barriers still remain, disabled persons can traverse the campus with a minimum of difficulty. University libraries, the student unions, several residence halls, and more recently constructed classroom buildings are accessible to students in wheel chairs. Early registration, preferential scheduling, readers, notetakers, interpreters, alternative testing procedures, and special parking arrangements are some of the accommodations available to disabled students. For more information, contact Continuing Studies at (978) 934-2472, or visit http://www.uml.edu/student-services/disability

Q. What do I do if I think my grade(s) for a course is incorrect?

A. Please refer to our Academic Policies either online or see page 34 for information on Complaints Arising from Grades and Grading Policy of the Faculty Member as well as Complaints Concerning Classroom Matters Exclusive of Grades and Grading Policy.

Q. May I have access to my student records?

A. Students may access their records securely through the new Intercampus Student Information System (ISIS).

The Family Rights and Privacy Act of 1974 grants any student currently in attendance, or to any former student, the right of access to inspect or review his or her educational files, records, or data. Students who wish to inspect their records must file a Right of Access Form with the office or department in which the desired record is kept. Right of Access Forms are available in the Office of Student Services. Within 10 days of receipt of the Right of Access Form, the office or department will notify the student as to the date, time, and location that the desired record will be available for inspection.

Application Forms

University of Massachusetts Lowell
Admissions/Continuing Studies
Dugan Hall Room 110
883 Broadway Street
Lowell, MA 01854-5104

Certificate Program Application for Admissions

Student Information	Name:	Soc.Sec.#:
	Address Line 1:	Home Phone:
	Address Line 2:	Work Phone: Cellular Phone:
	City: State: Zip:	Email:
	Occupation:	Other Name(s) Under Which Records Might Be Found:
	Employer:	Does Your Employer Offer Tuition Reimbursement? ☐ Yes ☐ No

Citizenship	*All applicants must complete this section. Please check the appropriate boxes.*
	☐ I am a citizen of the United States.
	☐ I am a Permanent Resident of the United States with a valid I-551 (green card); a citizen of _____ (country), Registration Number _____ , Date issued _____ . Please send a copy (front and back) of your alien registration card to Continuing Studies and Corporate Education.
	☐ I am an international student and already hold a visa. My current status is ☐ F-1 ☐ J-1 ☐ H-1 ☐ Other _____ *Please note: Students holding a B-1, B-2, or F-2 visa will not be eligible for degree/certificate programs, or to enroll in classes.*

Certificate	☐ Computer Assisted Manufacturing	☐ Information Technology	☐ Security Management & Homeland Security
(check one)	☐ Computer Engineering Technology	☐ Land Surveying	☐ Spanish and Latin American Studies
	☐ Contemporary Communications	☐ Manufacturing Technology	☐ Technical Writing
	☐ Database Management	☐ Multimedia Applications	☐ UNIX
	☐ Data/Telecommunications	☐ Nutrition	☐ Wastewater Treatment
	☐ Electronics Technology	☐ Paralegal Studies	☐ Water Treatment
	☐ Graphic Design & Digital Imaging	☐ Plastics Engineering Technology	☐ Website Design & Development

Anticipated Admission Date	☐ Fall ☐ Spring ☐ Summer Year: _____

Learning Format	*Please Indicate the Learning Format Through Which You Plan to Take Courses (check one):*			
	☐ On Campus	☐ Online	☐ Off-Campus Location	☐ Mixed

Educational Background	*List all high schools, colleges and post-secondary schools attended. The Right of Privacy Act requires that you must arrange to have all official transcripts sent from each institution attended. Students who do not have a high school diploma must forward an official copy of the GED.*			
	Name of High School:	City, State of High School:		
	Date of Completion of High School:	Date of Completion of G.E.D. Certificate (if applicable):		
	Colleges, Universities, or Post-Secondary Schools attended (list most recent first):			
	Name of School	City	State	Dates
	Highest Degree Held:			

Required Data	☐ Male	☐ Female	Date of Birth:			
Optional Data	☐ Asian	☐ Black	☐ Caucasian	☐ Hispanic	☐ Native American/Alaskan	☐ Other
	Veteran	☐ Yes	☐ No	☐ Still active duty		

Signature	*I certify that the information furnished on this application is complete and accurate.*	
	Signature:	Date:

Send Applications and Transcripts to: University of Massachusetts Lowell, Admissions/Continuing Studies and Corporate Education, Attention: Kathleen Shannon, Dugan Hall, Room 110, 883 Broadway Street, Lowell, MA 01854-5104, or Fax to: (978) 934-3086, Attn: K. Shannon.
Questions? Call our Faculty and Student Support Center at (978) 934-2474 for assistance!

Please Note: Please note that your application will not be processed until Continuing Studies and Corporate Education receives the following documents: 1) an official high school transcript or GED, 2) official college transcripts, and 3) international student IDs. Applications are accepted on an ongoing basis and there is no fee to apply. Upon receipt of all official documents, notification will be sent to students in four to six weeks. If you have any questions, please Kathleen Shannon at (978) 934-3931 or email Kathleen_Shannon@uml.edu. Applicants without any previous college experience must have an official transcript of their high school record or a copy of their GED forwarded. Applicants with previous college experience need not forward high school or GED transcripts if a high school diploma or GED is indicated on their college transcripts.

University of Massachusetts Lowell
Admissions/Continuing Studies
Dugan Hall Room 110
883 Broadway Street
Lowell, MA 01854-5104

Degree Program Application for Admissions

Please note: Return completed application form along with the $40 application fee.

Student Information	Name:	Soc.Sec.#:
	Address Line 1:	Home Phone:
	Address Line 2:	Work Phone: Cellular Phone:
	City: State: Zip:	Email:
	Occupation:	Other Name(s) Under Which Records Might Be Found:
	Employer:	Does Your Employer Offer Tuition Reimbursement? ☐ Yes ☐ No

Citizenship	*All applicants must complete this section. Please check the appropriate boxes.*
	☐ I am a citizen of the United States.
	☐ I am a Permanent Resident of the United States with a valid I-551 (green card); a citizen of _____ (country) Registration Number _____, Date issued _____. Please send a copy (front and back) of your alien registration card to Continuing Studies and Corporate Education.
	☐ I am an international student and already hold a visa. My current status is ☐ F-1 ☐ J-1 ☐ H-1 ☐ Other_____ *Please note: Students holding a B-1, B-2, or F-2 visa will not be eligible for degree/certificate programs, or to enroll in classes.*

Intended Major	☐ Associate's ☐ Bachelor's	
	Indicate Intended major: (Required)	*Indicate Subplan or Concentration(s): (Required) Note: If there is no subplan or concentration, please indicate "General"*

Anticipated Admission Date	☐ Fall ☐ Spring ☐ Summer Year: _____

Learning Format	**For AS or BS Information Technology and Bachelor of Liberal Arts Degrees** *Please Indicate the Learning Format Through Which You Plan to Take Courses (check one):*			
	☐ On Campus	☐ Online	☐ Off-Campus Location	☐ Mixed (Online/On Campus)

Educational Background	*List all high schools, colleges and post-secondary schools attended. The Right of Privacy Act requires that you must arrange to have all official transcripts sent from each institution attended. Students who do not have a high school diploma must forward an official copy of the GED.*			
	Name of High School:		City, State of High School:	
	Date of Completion of High School:		Date of Completion of G.E.D. Certificate (if applicable):	
	Colleges, Universities, or Post-Secondary Schools attended (list most recent first):			
	Name of School	City	State	Dates
	Highest Degree Held:			

Required Data	☐ Male ☐ Female	Date of Birth:
Optional Data	☐ Asian ☐ Black ☐ Caucasian ☐ Hispanic ☐ Native American/Alaskan ☐ Other Veteran: ☐ Yes ☐ No ☐ Still active duty	

Signature	*I certify that the information furnished on this application is complete and accurate.*	
	Signature:	Date:

Send Completed Applications and Official Transcripts to: University of Massachusetts Lowell, Admissions/Continuing Studies and Corporate Education, Attention: Kathleen Shannon, Dugan Hall, Room 110, 883 Broadway Street, Lowell, MA 01854-5104

Questions? Call our Faculty and Student Support Center at (978) 934-2474 for assistance, or check out our website at http://continuinged.uml.edu

Please Note: Please note that your application will not be processed until Continuing Studies and Corporate Education receives the following documents: 1) an official high school transcript or GED, 2) official college transcripts, and 3) international student IDs. Applications are accepted on an ongoing basis and there is a $40 fee to apply. Upon receipt of all official documents, notification will be sent to students in four to six weeks. If you have any questions, please call Kathleen Shannon at (978) 934-3931 or email Kathleen_Shannon@uml.edu. Applicants without any previous college experience must have an official transcript of their high school record or a copy of their GED forwarded. Applicants with previous college experience need not forward high school or GED transcripts if a high school diploma or GED is indicated on their college transcripts.

Index

Directory

IMPORTANT PHONE NUMBERS

Continuing Studies Main Number	(978) 934-2474
Continuing Studies Fax Number	(978) 934-4006
Continuing Studies Faculty and Student Support Center	(978) 934-2474
Online Courses Toll Free Number	(800) 480-3190
Directions to UMass Lowell	(978) 934-5800
Library - UMass Lowell North (Alumni/Lydon)	(978) 934-3205
Library - UMass Lowell South (O'Leary)	(978) 934-4550
UMass Lowell Main Number	(978) 934-4000
Weather Cancellations	(978) 934-2121
UMass Lowell Career Services	(978) 934-2355
UMass Bookstore - UML North	(978) 934-2623
UMass Bookstore - UML South	(978) 934-6908

OFFICE LOCATIONS

Continuing Studies Administration	Southwick 303
Continuing Studies Faculty & Student Support Center	Southwick 202
Campus Police	Ball 125
College of Arts and Sciences	Olney 524 (North) Durgin 104 (South)
College of Management	Pasteur 305
Financial Aid	Dugan 102
Francis College of Engineering	Kitson 311
Graduate School of Education	O'Leary Library, 5th flr.
Office of Career Services	Southwick 200
Registrar's Office	Dugan 104
School of Health & Environment	Weed 103
UMass Lowell Bookstores	
UML North	Falmouth Hall Basement
UML South	South Dining Hall

PARKING INFORMATION

New parking stickers are required for all Continuing Studies students. The parking registration form is available at http://parking.uml.edu. This sticker entitles students to park after 5:30pm in a University parking lot except Cumnock Hall. Students are encouraged to park in the numerous parking lots on the UML North and UML South campus. Students and faculty should not compromise public safety by blocking access of fire lanes, ambulance and other emergency vehicles. Students and faculty should not park in handicap spaces unless they display a handicap sticker. Student and faculty cars will be towed and/or ticketed for violations. In addition, the Lowell Police will tow student and faculty cars if parked in "Residential Parking" areas.

LOCATING YOUR CLASSROOM

Refer to the map and the building key to locate where your class will be held. If your class has not been assigned a classroom when you register, please check ISIS web self-service at http://isis.uml.edu.

CONTINUING STUDIES ADMINISTRATION

Executive Team

Catherine A. Kendrick, Executive Director of Distance Market Development & Corporate Outreach
Pauline Carroll, Executive Director of Academic Services, Enrollment Management & Administration
Amy M. Yacus, Assistant Director of Marketing & Outreach
Johanna Bohan-Riley, Assistant Director of Enrollment & Technical Services
Patrick Driscoll, Assistant Director of Technical Services

Continuing Studies Administrative Staff

Kim Downey, Advertising and Design Coordinator
Judith Feeney, Manager of UNIX Systems and Web Outreach Services
Jacqueline Hawk, Corporate Outreach Coordinator
Diane Laderoute, Staff Assistant
Margaret L'Heureux, Staff Assistant
Carrie Powanda-Croft, Distance Learning Course Developer and Faculty Trainer
Jean Russell, Staff Assistant
Albert Sacco, Technical Services Coordinator
Carolyn Siccama, Distance Faculty Developer
Gwen Picanco, Staff Assistant
Joanne Talty, Corporate Project Manager
Karen von Sneidern, Corporate Program Specialist
Alena Woods, Distance Learning Course Developer and Technical Specialist
Weiping Zhen, Technical Services Coordinator

Part-Time Administrative Staff, Project Managers and Faculty & Student Support Specialists

Sarah Beaulieu
James Donohoe
Fran Flynn
Patricia Gallagher
Frances Gilday
William Langdell
Pasque Leary
Eleanor Poor
Vicky Reyes
Carol Roberts
Ursula Steele
Susan Wartman
Elizabeth Wesson

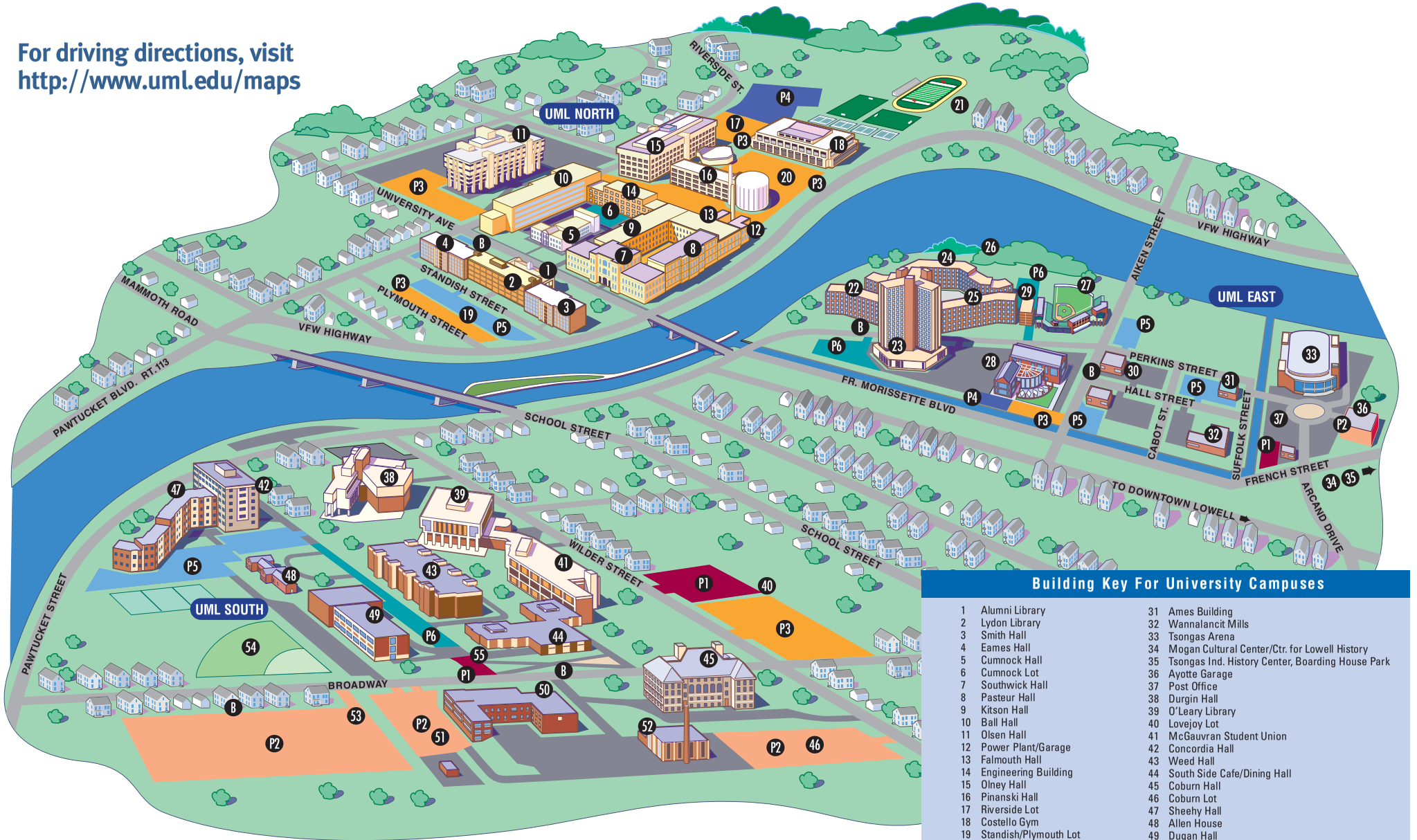
Evening Supervisors

Professor Alan Doerr
Professor Bernard Shapiro

Continuing Studies Faculty Program Coordinators

Michael Berry: Civil Engineering Technology
Associate Professor Paul Damour: Biology, Chemistry, Environmental Science, Physics
Professor Alan Doerr: Mathematics
Professor Stephen Driscoll: Plastics Engineering Technology
Professor Ann Marie Hurley: Information Technology
Professor Joseph Lipchitz: Liberal Arts, Criminal Justice, Paralegal Studies
Professor Richard Siegel: Liberal Arts, Psychology
Assistant Professor Glenn Sundberg: Mechanical Engineering Technology
Professor Robert Tuholski: Department Head, Mechanical Engineering Technology
Professor Fahd Wakim: Electronic Engineering Technology

For driving directions, visit http://www.uml.edu/maps



Parking on Campus

Parking on Campus: www.uml.edu/parking.

Visitors may park in lots marked "Visitor" or "Open to All." Additional parking spaces are available with permission and a visitor parking pass.

All members of the UML community must **register any vehicle** they operate on campus. Instructions for registering a vehicle are on the web page.

Carpooling: Ridefinder (www.uml.edu/ridefinder) helps connect faculty, staff and students interested in carpooling.

(P) Where to Park

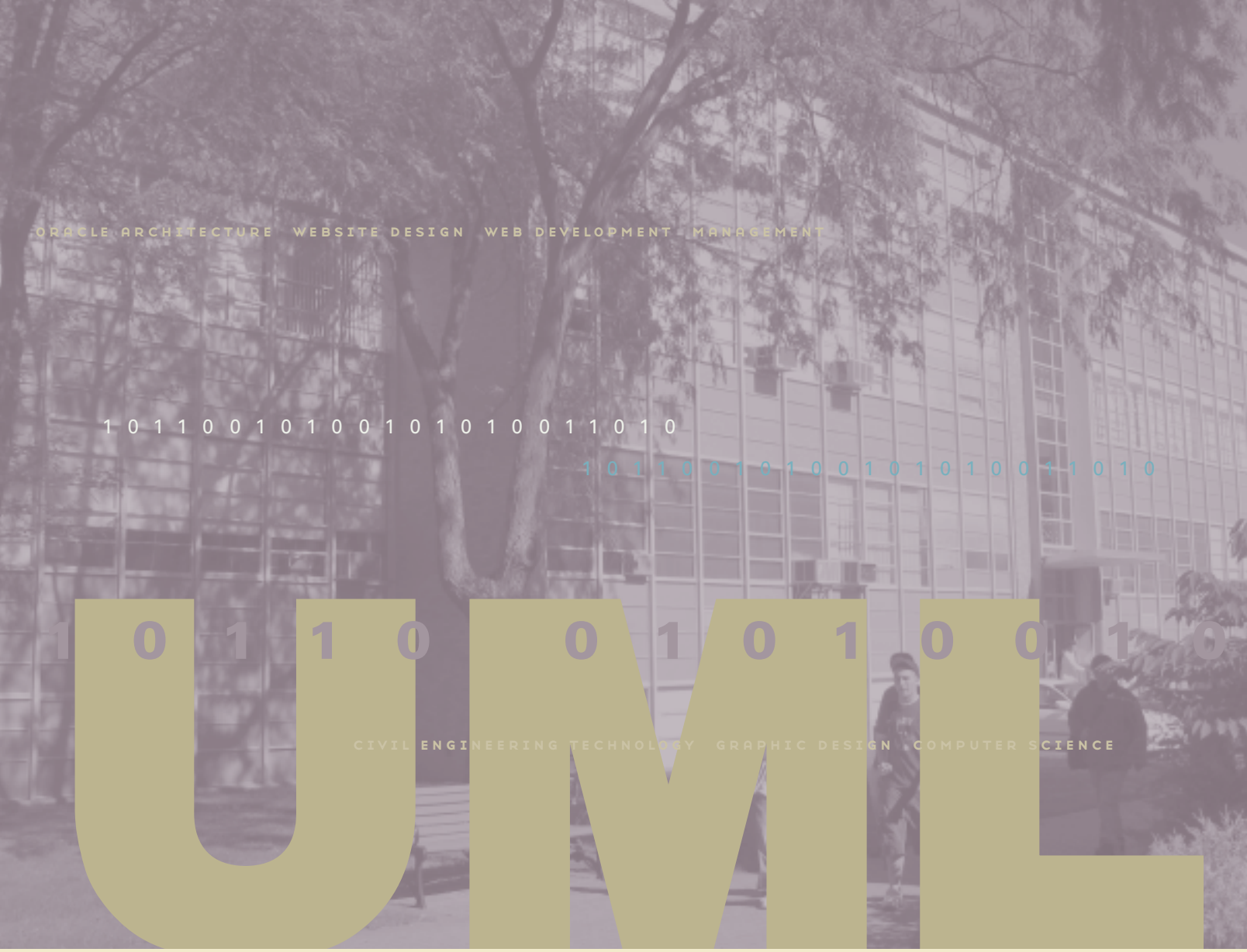
- P1-Visitors
- P2-Open to All
- P3-Faculty/Staff
- P4-Commuter Students
- P5-Resident Students (lots usually restricted to students living in closest hall)
- P6-Restricted

H Nearly every parking lot has designated handicapped spots. Those located in gated lots can be accessed by talking to the dispatcher via intercom at the gate.

Building Key For University Campuses

1 Alumni Library
2 Lydon Library
3 Smith Hall
4 Eames Hall
5 Cumnock Hall
6 Cumnock Lot
7 Southwick Hall
8 Pasteur Hall
9 Kitson Hall
10 Ball Hall
11 Olsen Hall
12 Power Plant/Garage
13 Falmouth Hall
14 Engineering Building
15 Olney Hall
16 Pinanski Hall
17 Riverside Lot
18 Costello Gym
19 Standish/Plymouth Lot
20 Costello Lot
21 Cushing Field Complex
22 Leitch Hall
23 Fox Hall
24 Donahue Hall
25 Bourgeois Hall
26 Riverwalk
27 LeLacheur Park
28 Campus Center
29 Parking Garage
30 Institute for Plastics Innovation
31 Ames Building
32 Wannalancit Mills
33 Tsongas Arena
34 Mogan Cultural Center/Ctr. for Lowell History
35 Tsongas Ind. History Center, Boarding House Park
36 Ayotte Garage
37 Post Office
38 Durgin Hall
39 O'Leary Library
40 Lovejoy Lot
41 McGauvran Student Union
42 Concordia Hall
43 Weed Hall
44 South Side Cafe/Dining Hall
45 Coburn Hall
46 Coburn Lot
47 Sheehy Hall
48 Allen House
49 Dugan Hall
50 Mahoney Hall
51 Mahoney Lot
52 Power Plant
53 Riverview Lot
54 Riverview Field
55 Admissions Handicapped Parking

(P) Parking (B) Bus stop



University of Massachusetts Lowell

Continuing Studies, Corporate and Distance Education
One University Avenue
Lowell, MA 01854-2881

Phone: (978) 934-2474
Email: Continuing_Education@uml.edu
http://continuinged.uml.edu