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.

Continuing Studies Executive Team: Top Row: Amy Yacus, Jacqueline F. Moloney, and Steven Tello; Bottom Row: Pauline Carroll, Johanna Bohan-Riley, Catherine Kendrick

About Continuing Studies

With over 65 years of service to adult learners, primarily in Massachusetts and New Hampshire, UMass Lowell's Division of Continuing Studies 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 receives approximately 25,000 enrollments annually. It is one of the largest continuing education units in New England and the largest and most comprehensive among the five campuses in the state university system. It also is one of the oldest continuing education units in the state, 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 lifelong 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 phone, fax, mail or walk-in. Existing students also have self-service access through 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 Enrollment Services/Continuing Studies and Corporate Education at (978) 934-2480. Current semester course offerings are also available on the World Wide Web at http://continuinged.uml.edu/

getting started
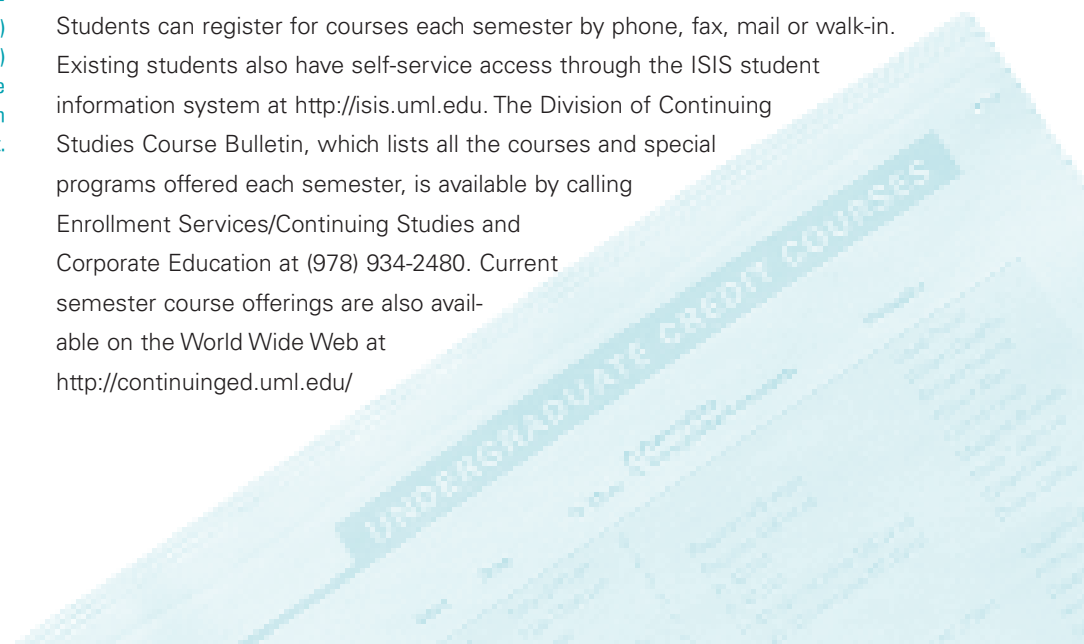
About the University

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 colleges of Arts and Sciences, Engineering, Health Professions, and Management, the Graduate School of Education, and the Division of Continuing Studies and Corporate 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, Dean of Continuing Studies and Corporate Education

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:

Accreditation Board for Engineering and Technology
AACSB - American Assembly of Collegiate Schools of Business
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 programs offered through the Division of Continuing Studies are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET):
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

Academic Advising

ACADEMIC ADVISING AND COUNSELING

Students who choose to pursue a degree program are assigned an Academic Faculty and Student Support Specialist. Students are encouraged to arrange an appointment with the Program Advisor upon admission into a program. The Advisor will outline a program of study, taking into consideration previous academic credit. Although the Program Advisor 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. Academic Faculty and Student Support Specialists are available to talk to students about courses, transfer credit, degree requirements, and other matters of individual concern.

DROP-IN ADVISING CENTER

Students are welcome to drop by the Faculty and Student Support Center, located in Southwick Hall 202, Monday through Thursday, 8:30 am to 8:00 pm and Friday from 8:30:00am to 5:00pm for general advising, information on associate's and baccalaureate 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 GENERAL FACULTY 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 General Faculty and Student Support Specialists and Program Coordinators 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. Evening supervisors also are available Monday through Thursday from 5:00 to 8:00 pm 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, UMass Lowell North.

GRADUATE PROGRAMS

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

> "Thank you for your personal touch, and for the dedication to do the best you can for each student you see."
>
> --Wendy Sullivan, Continuing Studies Student

Applying into a Degree or Certificate Program

The Division of Continuing Studies and Corporate 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 equivalent 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, associate's degree, or a bachelor's degree must also apply for admission to a program through the Division of Continuing Studies and Corporate Education. 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. Continuing Studies operates on a rolling admissions basis and each application is reviewed when the student's file is complete. 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 and Corporate Education publications and catalog.

Students who have questions about the interpretation or application of University academic policies should consult with an Academic Counselor or Program Coordinator.

ADMISSIONS INTO CERTIFICATE PROGRAMS

UMass Lowell offers a wide variety of credit certificate programs which 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 pages 65-92.

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 pages 19-64.

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.

Note: Students who are interested in admission into graduate-level degree or certificate programs should contact the Graduate School at (800) 656-GRAD or (978) 934-2380, or visit the Graduate School website at http://www.uml.edu/grad.

ADMISSION INTO A GRADUATE CERTIFICATE OR DEGREE PROGRAM

Students interested in applying into Graduate degree or certificate programs should contact the Graduate School 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 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.

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 the semester bulletin. Existing students also have self-service access through the ISIS student information system at http://isis.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 and fees 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/.

Q Do I have to enroll in a degree or certificate to take CSCE 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. For more information on applying into a degree program, see page 19. See page 65 for information on applying into a certificate program.

TUITION REFUND SCHEDULE

Refunds of credit program tuition, if any, are made on the basis of the date and time of receipt of a student's official drop. Any eligibility for tuition refund is based on the academic calendar, not class attendance. The date of withdrawal is the primary basis for the claim for tuition refund. Refunds also may be authorized for documented reasons and/or extenuating circumstances deemed acceptable by the Student Status Committee. The refund is prorated as follows:

Undergraduate drop before class begins	100%
Drop from 1st to 7th calendar day	80%
Drop from 8th to 14th calendar day	50%
Drop after 15th calendar day	No refund

Note: Fees are not refunded unless Continuing Studies is responsible for cancellations. See semester bulletin and the Continuing Studies website at http://continuinged.uml.edu/ for accelerated and graduate course tuition refund schedule. Students withdrawing from any class must officially notify Enrollment Services/Continuing Studies on forms provided by the Office. Verbal messages to faculty or staff do not constitute official notification.

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

All payments are due at the time students register for classes. A student who is in debt to the University at the end of any term or Summer Session may not register for another term or receive transcripts or diplomas until the balance is paid. Should it be necessary to utilize the services of a collection agency or attorney for an overdue account, the student will be liable for any and all legal fees, commissions, and associated service charges.

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.

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

SENIOR CITIZEN WAIVERS

Senior citizens (60 years or older) who are Massachusetts residents 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 and other fees. Proof of Massachusetts residency and birth date must be provided annually at the time of registration. However, due to the high costs of online courses, there are no waivers available for these courses. For additional information call (978) 934-2588.

VETERAN'S BENEFITS

Veterans must be matriculated in an undergraduate degree or certificate program and have all appropriate paperwork on file in Enrollment Services/Continuing Studies and Corporate 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 other registration 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 (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.

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 include the appropriate forms or authorizing letters with their registration, or have them on file. Registrations for third-party payment must be made by mail or in person. No tuition refund is awarded for late submission of eligibility forms. Students receiving company reimbursement must pre-pay their own tuition. For additional information, call (978) 934-2479.

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 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. 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.

A Step-by-Step Guide to Registering for Courses

✓ SELECT COURSE(S) FROM OUR PRINTED COURSE BULLETIN OR WEBSITE.
   http://continuinged.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 which limit registration. If you plan to select courses requiring consent of instructor or departmental approval, contact the department offering the course to obtain permission 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 at Continuing_Education@uml.edu

✓ CONTACT ENROLLMENT SERVICES/CONTINUING STUDIES TO REGISTER BY MAIL, FAX OR PHONE.

Returning students have self-service access through the ISIS student information system at http://isis.uml.edu.

Mail-In Registration. The registration form is available at: http://continuinged.uml.edu//regform.htm.
⇨ Fill out the registration form and return it postmarked no later than the scheduled deadline.
⇨ Mail to: University of Massachusetts Lowell, Enrollment Services/CSCE, Dugan Hall, Room 104, 883 Broadway Street, Lowell, MA, 01854-5104.
⇨ Payment must be made with the registration form, either by check, money order, VISA, Master Card, or Discover. Make checks payable to University of Massachusetts Lowell.
⇨ Students will receive class confirmation, room assignment, receipt and ID by mail before the first class meeting.

Fax-In Registration. Registration form available at: http://continuinged.uml.edu/General/regform.htm.
⇨ Fill out the registration form and fax it to (978)934-3087 no later than the scheduled deadline. Be sure to include your VISA, Master Card, or Discover number.

✓ MAKE PAYMENT FOR COURSE(S)

Methods of Payment
⇨ Valid Credit Card: Discover, Master Card or Visa.
⇨ Cash before 4:00 pm Monday through Friday.
⇨ Check/Money Order.
⇨ Financial Aid. Call 978-934-4220 or visit website at http://www.uml.edu/financialaid/
⇨ Third-Party Payment: All students using company direct payment, military plans, state tuition waivers, or veteran's waivers must include the appropriate forms or authorizing letters with their registration, or have them on file. No tuition refund is awarded for late submission of eligibility form. Students receiving company reimbursement must prepay their own tuition.

✓ YOUR RECEIPT AND REGISTRATION CONFIRMATION ARE SENT AFTER REGISTRATION IS COMPLETE.

✓ YOUR CLASSROOM ASSIGNMENTS AND SEMESTER SCHEDULE MAY BE ACCESSED ON THE ISIS WEB-BASED SELF-SERVICE SYSTEM AT HTTP://ISIS.UML.EDU.

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 State 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 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 Continuing Studies Division. 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.

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

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

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.

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.

Contact the Financial Aid Office at (978) 934-4220 if you have additional questions.

HOFF SCHOLARSHIPS

Scholarships are available to Continuing Studies and undergraduate degree students who are U.S. citizens (or eligible non-citizens) and permanent residents of Massachusetts. Need-based finanical support for the program is provided by the Charles J. Hoff Foundation, which has pledged to fund several scholarships per year. For information on these scholarships, please contact the Continuing Studies Faculty and Student Support Center at (978) 934-2474 during the month of January. Applications, including a Free Application for Federal Student Aid (FAFSA), must be filed prior to the beginning of March.

ASL ADULT EDUCATION FOUNDATION GRANTS

Alpha Sigma Lambda Adult Education Grants are available for Continuing Studies 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. Contact the Continuing Studies Faculty and Student Support Center at (978) 934-2474 for additional information.

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

UNDERGRADUATE STUDENTS

Undergraduate students withdawing 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 Enrollment Services.

GRADUATE STUDENTS

Graduate students withdawing from the University must obtain the appropriate signatures on the withdrawal clearance form and submit it to the Graduate School to ensure that academic and financial obligations are cleared before leaving the University.

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 perior 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 percent 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.

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, on-line 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 on-line account. These accounts are limited to UMass Lowell students and alumni.

Office hours are 8:30 a.m.- 5:00 p.m., Monday through Friday.

SERVICES FOR LEARNING AND PHYSICALLY DISABLED STUDENTS

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 the Division of Continuing Studies at (978) 934-2474.

Special Events for Continuing Studies Students!

⇨ **Open Houses and Student Orientation Nights**

⇨ **Career Open Houses & 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 and Corporate Education students 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 5000 videos; 8,600 music scores; and 5,500 sound recordings. More than 250 Internet accessible databases, many offering full text, are available from our 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 in the Virtual Catalog Project. This is a collaboration among the Boston Library Consortium and several regional library networks, which allows patrons to request items not owned by UMass Lowell from the book collections of cooperating libraries. The Libraries also provide 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 Web page, http://library.uml.edu, or call 978-934-4550 for O'Leary Library, 978-934-3205 for Lydon Library.

UNIVERSITY BOOKSTORES

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

UMass Bookstore - UMass Lowell North: 978-934-2623
UMass Bookstore - UMass Lowell South: 978-934-6908

TEXTBOOKS

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

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

New parking stickers are required for all Continuing Studies students. The Parking 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.

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.

SAFETY SHUTTLE SERVICE

The University now operates a motorized Student Escort Service seven nights a week from 6:00 p.m. to 1:00 a.m. 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 7:15 a.m. through 11:00 p.m. on class days. Detailed schedules are posted around campus and are available at the Office of University Life (UMass Lowell North) and the Office of Student Activities and Commuter Services (UMass Lowell South).
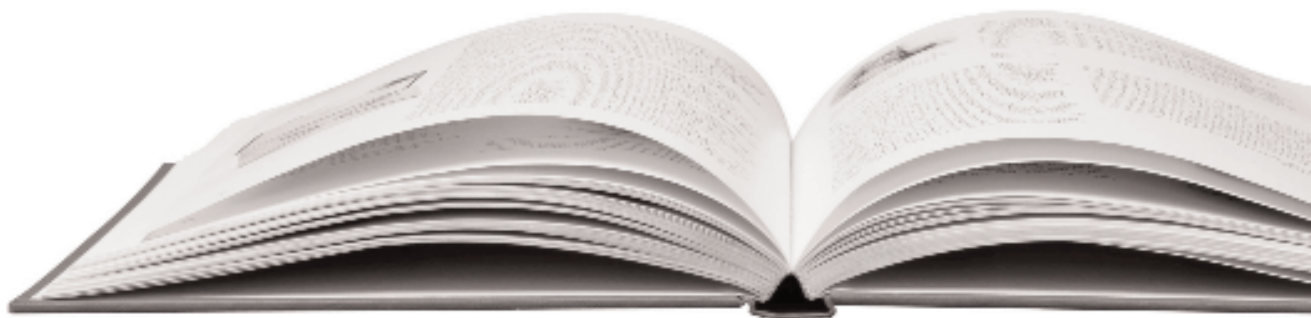
degree programs

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

A Step-by-Step Guide:
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 we offer on a part-time, evening basis, visit http://continuinged.uml.edu/degrees/index.htm.

✓ Mail the application with the $20 application fee -to:
        University of Massachusetts Lowell
        Admissions/Continuing Studies and Corporate 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* directly to 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 (http://continuinged.uml.edu)

✓ Once your application and transcripts have been received, you will receive a confirmation letter from Admissions/Continuing Studies and Corporate Education.

RECOMMENDED:

✓ Attend Open House/Orientation (http://continuinged.uml.edu).

✓ Speak with an academic 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. (http://continuinged.uml.edu - click on "Registration & Financial Info - Tuition & Fees")

✓ 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 UMass Lowell North, Monday through Thursday from 8:30 a.m. to 8:00pm and on Friday from 8:30am to 5:00 p.m.

Degree Programs: admission 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 advisors 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 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. For information on admissions into a degree program, please see below.

Since undertaking a degree program requires careful planning and scheduling of classes, students are encouraged to meet with an Academic Faculty and Student Support Specialist prior to registering for courses. Academic Faculty 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 an 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 Division of Continuing Studies and Corporate Education.

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. Continuing Studies operates on a rolling admissions basis and each application is reviewed when the student's file is complete. 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 $20 degree application fee;
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 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 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. Academic Counselors and 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 which 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 which 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 which 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 which 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-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 which 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 AND CORPORATE 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. Full notation of approved courses (including those failed) is made upon the permanent record of Continuing Studies and Corporate Education students.

ADMISSION INTO A GRADUATE CERTIFICATE OR DEGREE PROGRAM

Students interested in applying into Graduate degree or certificate programs should contact the Graduate School 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 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.

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 the Division of Continuing Studies and Corporate Education with the application.

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 which 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 Division of Continuing Studies and Corporate Education at 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 pro-rated 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 which 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 which are unacceptable to the transfer institution for its own associate's or bachelor's programs or which 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 which were taken more than ten years prior to the date when a student applies for transfer when, in the opinion of Department Chairpersons and Program Coordinators, the knowledge attained in such courses is deemed to be out of date and/or in need of verification. Competencies which 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 which 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 which 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 which are permitted within the specifications for minimum degree requirements, transferred courses which 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 which 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
   Enrollment Services/Continuing Studies and Corporate Education
   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 Continuing Studies 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.

GENERAL EDUCATION/UNIVERSITY CORE REQUIREMENTS
Depending upon the date of original enrollment in Continuing Studies at the University of Massachusetts Lowell, each student is responsible for satisfying either the General Education Requirements or the University Core Requirements.

Students who enrolled in an associate's or bachelor's degree program during or after the Fall 1994 semester should refer to the General Education Requirements below for guidance on course selection.

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.

GENERAL EDUCATION REQUIREMENTS
For students who enrolled in an associate's or bachelor's degree program during or after Fall 1994.

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
BS	Behavioral and Social Sciences
BSA	BS or AE
BSV	BS or VC
CW	College Writing

HS	Historical Studies
HSA	HS or AE
HSV	HS or VC
LT	Literature
LTV	LT or VC
MA	Mathematics
SC	Science
SCV	SC or VC
SL	Science with experimental learning
ST	Science Technology
STL	Science Technology with experimental learning
VC	Values, Concepts, and Choice
VCA	Values, Concepts, Choice, and Aesthetics

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.

GENERAL EDUCATION 2000 PROGRAM
Students following the General Education 2000 Program should see the website at http://www.uml.edu/gened/.

GRADUATION
Note: Please see page 67 for information regarding the completion of certificate programs.

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 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 made in person at Continuing Studies, or by calling (978) 934-2474.

UNIVERSITY HONORS

The University awards degrees with three levels of distinction upon those graduating students who have exhibited exceptional scholastic records. To graduate with honors, a student must have achieved a minimum grade-point average of 3.00 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 student's cumulative average for both associate's and bachelor's degrees must fall within the ranges set forth by each college.

COMMENCEMENT FEE

A fee of $75.00 is required of graduating students and is payable on or before registration for the final semester in which the student qualifies for the degree. The fee covers the cost of the student's eligibility review, the diploma, invitations, and the cap and gown for the graduation ceremony. All students are required to pay the graduation fee regardless of attendance at the graduation ceremony.

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 available at: http://continuinged.uml.edu/policies/graduation.htm

✓ March:
⇨ Complete graduation interview for Spring and Summer Graduates Information available at:
http://continuinged.uml.edu/policies/graduation.htm
⇨ Complete Chancellor's Medals application

✓ Beginning of April:
⇨ Pay graduation fee and all outstanding financial obligations

✓ Mid April:
⇨ Check the April issue of UML's school newspaper *The Connector* for correct spelling of your name as it will appear on your diploma
⇨ For corrections contact Enrollment Services/Continuing Studies and Corporate Education at (978) 934-2588

✓ Beginning of May:
⇨ Commencement Information booklet mailed
⇨ Pick up cap and gown and commencement tickets at bookstore as noted in Commencement Information booklet
⇨ Alpha Sigma Lambda members pick up academic cord at the Faculty and Student Support Office, Southwick 202, UMass Lowell 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 at:
http://continuinged.uml.edu/policies/graduation.htm

Associate's & Bachelor's Degrees — Curriculum Outlines

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

All of the academic majors and options are listed within each College. Each curriculum outline consists of a suggested course 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.

B.L.A. - Bachelor of Liberal Arts

NEW! B.S. in Psychology

A.S. in Information Technology

B.S. in Information Technology

NEW! B.S. in Information Technology: Business Minor

Earn a Second B.S. in Information Technology

B.S. in Criminal Justice

B.S. in Criminal Justice: Paralegal Option

B.S. in Mathematics

B.S. in Applied Mathematics

B.S. in Mathematics: Statistics Concentration

B.S. in Mathematics: Teacher Concentration

A.S. in Civil Engineering Technology
    Surveying Option

B.S. in Civil Engineering Technology

B.S. in Civil Engineering Technology: Environmental 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 Mechanical Engineering Technology:
   Manufacturing Option

B.S. in Mechanical Engineering Technology: Plastics Option

A.S. in Management

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

degree programs

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.

Information Technology, A.S., B.S.

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 REQUIRE-MENTS, SEE PAGE 65 OR VISIT OUR WEB-SITE 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 are available in Art History, English, History, Legal Studies, Psychology, and Women's Studies.

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.

BACHELOR OF LIBERAL ARTS
TOTAL CREDITS: 120

This degree consists of 48-60 credits with concentrations in two liberal arts disciplines. Concentrations are available in Art History, English, History, Legal Studies, Psychology, and Women's Studies.

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 - GenEd	3
		6

SECOND SEMESTER

42.102	College Writing II - GenEd	3
-.- - -	Social Sciences Course - GenEd	3
		6

THIRD SEMESTER

-.- - -	Science w/Lab Course - GenEd	4
-.- - -	Art/Humanities Course - GenEd	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

-.- - -	Science w/Lab Course - GenEd	4
-.- - -	Art/Humanities Course - GenEd	3
		7

THIRD YEAR
FIRST SEMESTER

-.- - -	Concentration I Elective	3
-.- - -	Social Sciences Course - GenEd	3
		6

SECOND SEMESTER

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

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

-.- - -	Science: Non-Lab Course - GenEd	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

-.- - -	Art/Humanities Course - GenEd	3
-.- - -	Social Sciences Course - GenEd	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

Psychology

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 (ON CAMPUS OR ONLINE PROGRAM)
YEARS 1-7: SUGGESTED COURSE 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 on or after September 2005.

FIRST YEAR
FIRST SEMESTER
42.101	College Writing I (Gen. Ed.)	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 (Gen. Ed.)	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 1: Basics*	3
47.232	Psychology of Personality or 47.272 Abnormal Psychology	3 / 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 47.255 Community Psychology	3 / 6

THIRD SEMESTER
47.- - -	Experimental Psychology Elective**	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 - Ars/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	3
-.- - -	300/400 Psych. or Free Elective	3 / 6

SECOND SEMESTER
-.- - -	300/400 Free Elective	3
-.- - -	Free Elective	3

THIRD SEMESTER
-.- - -	Free Elective	3
47.4 - -	Advanced Psych. Elective***	3 / 6

BACHELOR OF ARTS IN PSYCHOLOGY
(ON CAMPUS OR ONLINE PROGRAM)
Continued

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 Schedule of Classes booklet regarding all GenEd requirements. Courses in the General Education categories of Diversity and Ethics should be selected in conjunction with a faculty advisor. Please see below for additional requirements.

GENERAL REQUIREMENTS
(For freshmen entering Fall 2003 and subsequently)
A major in psychology consists of 36-45 credits with at least 15 credits at the 300 level or higher. Students transferring to the college and wishing to major in psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements.

Psychology Major
Each of the following 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

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

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:

47.276	Theories of Learning
47.277	Sensation and Perception
47.278	Cognitive Psychology
47.373	Brain, Mind & Behavior

Two 300/400 level Psychology courses:
47.300/400
47.300/400

One Advanced Seminar:

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

***One 400 level or higher psychology elective:

Seminar
Practicum (w/permission of instructor)
Directed Study (w/permission of Dept. Chair)
Tutorial (w/permission of Dept. Chair)
Graduate Level Course (Seniors w/instructor's perm.)

Suggested Courses:

47.480	Integrative Seminar in Developmental Disabilities I
47.481	Integrative Seminar in Developmental Disabilities II
47.482	Integrative Seminar III
47.485	Peer Tutoring: Psychology
47.486	Community Service Learning
47.491	Directed Study: Psychology
47.495	Advanced Tutorial in Psychology
47.496	Practicum in Psychology

If the student chooses to complete his/her degree with 45 credits, the remaining courses in the major may be any of the course offerings in Psychology, provided at least 15 credits of the 45 credit total are at or -above the 300 level. Note to transfer students: Only 6 credits of Dynamics classes may be used toward the major.

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 specialization interest. Concentrations are forumlated 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.

ASSOCIATE OF SCIENCE IN INFORMATION TECHNOLOGY (ON CAMPUS OR ONLINE PROGRAM)

YEARS 1-4: SUGGESTED COURSE 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 on or after September 2005.

FIRST YEAR
FIRST SEMESTER
90.160	Introduction to Information Systems	3
42.101	College Writing I (Gen. Ed)	3
90.112	Concepts in Algebra I*	3
		9

SECOND SEMESTER
90.202	Introduction to Personal Computers & Microsoft Office	3
42.102	College Writing II (Gen. Ed.)	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
-.- - -	Gen. Ed.- Arts, Humanities & Diversity (AHD)	3
		9

FOURTH YEAR
FIRST SEMESTER
92.183	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.

†Information Technology Electives may be chosen from any computer courses with a prefix of 90, 91, or 94.

††The student must choose a sequence of three (3) related (non-computer) courses to fulfill the concentration electives. Students should consult with their academic advisor regarding possible concentrations to fulfill this requirement.

Concentration Electives
The following courses are examples of courses that may be used towards this requirement 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.

31.201	Community Health
36.414	Infectious Disease
43.108	World History II
43.206	American Economic History
43.274	Native American History
43.308	Crime and Social Control
46.101	Introduction to American Politics
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

ASSOCIATE OF SCIENCE IN INFORMATION TECHNOLOGY (ON CAMPUS OR ONLINE PROGRAM)

Continued

47.477 Seminar: Contemporary Trends - Addictions
47.360 Human Development II
47.363 Introduction to Developmental Disabilities
48.351 Sociology of Health and Health Care
60.201 Accounting/Financial
62.201 Marketing Principles
63.301 Management Information Systems
69.275 Total Quality Management
69.281 Purchasing Principles

Information Technology Electives
The following courses are examples of courses available on campus and online:
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
90.233 Multimedia Authoring Software: Macromedia Director
90.236 Instructional Design for Interactive Media
90.238 Website Development: FrontPage/Windows
90.239 Multimedia Scripting with Director's Lingo
90.247 Advanced Web Authoring: Flash
90.249 Developing IT Training for the Web
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

degree programs

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B.S. IN INFORMATION TECHNOLOGY
YEARS 1-7: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 123

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.

For students entering the program on or after September 2005.

FIRST YEAR
FIRST SEMESTER
90.160	Introduction to Information Systems	3
42.101	College Writing I (Gen. Ed.)	3
90.112	Concepts in Algebra I*	3
		9

SECOND SEMESTER
90.202	Introduction to Personal Computers & Microsoft Office	3
42.102	College Writing II (Gen. Ed.)	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, Humanties & Diversity (AHD)	3
		9

FOURTH YEAR
FIRST SEMESTER
92.183	Introduction to Statistics	3
-.- - -	General Education - Arts & Humanties (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 & Humanties (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	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.

**Cannot get 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, 91, or 92.

††The student must choose a sequence of six (6) related (non-computer) courses to fulfill the concentration electives.

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (ON CAMPUS OR ONLINE PROGRAM)

YEARS 1-7: SUGGESTED COURSE 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 on or after September 2005.

FIRST YEAR

FIRST SEMESTER

90.160	Introduction to Information Systems	3
42.101	College Writing I (Gen. Ed.)	3
90.112	Concepts in Algebra I*	3
		9

SECOND SEMESTER

90.202	Introduction to Personal Computers & Microsoft Office	3
42.102	College Writing II (Gen. Ed.)	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

92.183	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.

†Information Technology Electives may be chosen from any computer courses with a prefix of 90, 91, or 94.

††The student must choose a sequence of six (6) related (non-computer) courses to fulfill the concentration electives. Students should consult with their academic advisor regarding possible concentrations to fulfill this requirement.

<u>Concentration Electives</u>
The following courses are examples of courses that may be used towards this requirement 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.

31.201	Community Health
36.414	Infectious Disease
43.108	World History II
43.206	American Economic History
43.274	Native American History
43.308	Crime and Social Control
46.101	Introduction to American Politics
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
47.477	Seminar: Contemporary Trends - Addictions
47.360	Human Development II
47.363	Introduction to Developmental Disabilities
48.351	Sociology of Health and Health Care
60.201	Accounting/Financial
62.201	Marketing Principles
63.301	Management Information Systems
69.275	Total Quality Management

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
(ON CAMPUS OR ONLINE PROGRAM)
Continued

69.281 Purchasing Principles
<u>Information Technology Electives</u>
The following courses are examples of courses available on campus and online:
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
90.233 Multimedia Authoring Software: Macromedia Director
90.236 Instructional Design for Interactive Media
90.238 Website Development: FrontPage/Windows
90.239 Multimedia Scripting with Director's Lingo
90.247 Advanced Web Authoring: Flash
90.249 Developing IT Training for the Web
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

B.S. IN INFORMATION TECHNOLOGY: BUSINESS MINOR (ONLINE PROGRAM)

YEARS 1-7: SUGGESTED COURSE 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 on or after September 2005.

FIRST YEAR
FIRST SEMESTER
90.160	Introduction to Information Systems	3
42.101	College Writing I (Gen. Ed.)	3
		6

SECOND SEMESTER
90.202	Introduction to Personal Computers & Microsoft Office (Students who can document proficiency in Microsoft Office may substitute an Information Technology elective)	3
42.102	College Writing II (Gen. Ed.)	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
92.183	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

*Cannot get 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, 91, or 92.

†Students need permission of College of Management Coordinator for these Business Minor Concentration Elective courses.

SECOND B.S. IN INFORMATION TECHNOLOGY

SUGGESTED COURSE 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 in Information Technology by taking 10 additional IT courses in designated areas.

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. Please contact our Faculty and Student Support Center at (978) 934-2474 for assistance.

Note: Many of the IT electives were previously offered under the department code 92. Please note the course number taken with its equivalent course code on the course completion worksheet.

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.

B.S. IN CRIMINAL JUSTICE
YEARS 1-7: SUGGESTED COURSE 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
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 - Behavioral & Social Sciences	3
92.183	General Education - Mathematics (Introduction to Statistics) OR	3
92.283	Statistics for Behavioral Sciences (recommended)	6

SECOND SEMESTER

-.- - -	General Education - Behavioral & Social Sciences	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 IV	3
-.- - -	General Education - Science*	3
		9

FOURTH YEAR

FIRST SEMESTER

-.- - -	Skills Requirement III	3
-.- - -	General Education - Literature	3
44.390	Introduction to Criminal Justice Research	3
		9

SECOND SEMESTER

-.- - -	General Education - Historical Studies	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 - Aesthetics	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 - Values, Concepts, and Choice	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.

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 course level or above.

B.S. IN CRIMINAL JUSTICE
Continued

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. Courses used to fulfill the professional skills requirement may be used toward fulfillment of this requirement. 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 Human 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
92.183 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: 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. Computer programming and statistics, proficiency to be demonstrated by passing a minimum of four courses (9 credits in the Mathematics Department) from the following approved list:

44.201 Computer Applications in Criminal Justice or equivalent, PLUS
91.113 Exploring the Internet or another approved course (see Advisor or Department Chair)

Then the student completes the requirement by taking the following:

92.183 Introduction to Statistics OR
92.283 Statistics for Behavioral Sciences
         AND ONE OF:
92.363 Introduction to Data Analysis
43.335 Quantitative Methods

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.

There are three main areas of tracks which 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

A 2.0 cumulative average overall and a 2.2 average in the major are necessary for graduation.

B.S. IN CRIMINAL JUSTICE: PARALEGAL OPTION

YEARS 1-7: SUGGESTED COURSE 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
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 - Behavioral and Social Sciences	3
46.230	Law and the Legal System	3
		9

SECOND SEMESTER
-.- - -	General Education - Behavioral and Social Sciences	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 - Literature	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 - Historical Studies	3
41.370	Real Estate Law	3
		9

SECOND SEMESTER
-.- - -	General Education - Science*	3
-.- - -	Free Elective	3
41.363	Corporate and Property Law	3
		9

SIXTH YEAR
FIRST SEMESTER
-.- - -	Paralegal Elective	3
-.- - -	Paralegal Elective	3
-.- - -	General Education - Values, Concepts, and Choice	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.

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
92.183	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

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 list of courses. 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 Human 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
92.183 Introduction to Statistics
92.363 Introduction to Data Analysis

A 2.0 cumulative average overall and a 2.2 average in the major are necessary for graduation.

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 which 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.
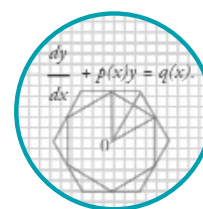
The Mathematical Sciences Department of the University offers three bachelors programs through Continuing Studies: Mathematics, Applied Mathematics and Information Technology. The Mathematics curriculum is intended for working professionals in a wide range of related disciplines: teaching, science, engineering, 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.

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.

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 twenty-first century. Many students come to the University to receive certificates in UNIX, Fundamentals of Information Technology, Multimedia Applications, Website Design and Development, or Data/Telecommunications. They can then pursue a degree in Information Technology by applying the courses taken to fulfill the certificate program requirements.

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.

For additional information on the different career opportunities available with the Bachelor's degree in Mathematics, visit http://www.uml.edu/dept/math/programs/ undergrad/emp_inf.htm.

BACHELOR OF SCIENCE IN MATHEMATICS

YEARS 1-7: SUGGESTED COURSE 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 on 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
-.- - -	Gen. Ed.- Science with Experimental Learning	3
-.- - -	Gen. Ed.- 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
-.- - -	Gen. Ed.- 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. 92.183 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 COURSE 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 on or after September 2005.

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

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

SECOND YEAR
FIRST SEMESTER
92.125	Calculus A	3
42.226	Technical and Scientific	3
	Communication	
99.131	Technical Physics I	3
		9

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

THIRD YEAR
FIRST SEMESTER
92.225	Calculus C	3
-.- - -	Elective**	3
-.- - -	General Education - Arts,	3
	Humanities & Diversity (AHD)	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	3
	(see Program Coordinator)	
-.- - -	Gen. Ed.- Science with	3
	Experimental Learning	
-.- - -	Gen. Ed.- Science with	1
	Experimental Learning Lab	10

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

FIFTH YEAR
FIRST SEMESTER
92.234	Differential Equations	3
92.301	Intro. to Applied	3
	Mathematics I	
-.- - -	Elective**	3
		9

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

SIXTH YEAR
FIRST SEMESTER
92.- - -	_____ Analysis†	3
-.- - -	Elective*	3
-.- - -	Concentration Elective*	3
		9

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

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

SECOND SEMESTER
92.475	Senior Seminar II (see	3
	Program Coordinator)	
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. 92.183 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 COURSE 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 on or after September 2005.

FIRST YEAR
FIRST SEMESTER

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

SECOND SEMESTER

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

SECOND YEAR
FIRST SEMESTER

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

SECOND SEMESTER

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

THIRD YEAR
FIRST SEMESTER

92.225	Calculus C	3
-.- - -	Elective**	3
-.- - -	General Education - Arts,	3
	Humanties & Diversity (AHD)	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	3
	(see Program Coordinator)	
-.- - -	Gen. Ed.- Science with	3
	Experimental Learning	
-.- - -	Gen. Ed.- Science with	1
	Experimental Learning Lab	10

SECOND SEMESTER

92.222	Linear Algebra II	3
-.- - -	General Education - Arts,	3
	Humanties & Ethics (AHE)	
-.- - -	Gen. Ed.- Science with	3
	Experimental Learning	
-.- - -	Gen. Ed.- Science with	1
	Experimental Learning Lab	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 -	3
	Social Sciences (SS)	
-.- - -	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	1
	Program Coordinator)	10

FIRST SEMESTER

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

SECOND SEMESTER

92.475	Senior Seminar II (see	3
	Program Coordinator)	
-.- - -	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. 92.183 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.

SEVENTH YEAR

BACHELOR OF SCIENCE IN MATHEMATICS: TEACHER CONCENTRATION

YEARS 1-7: SUGGESTED COURSE 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 on 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 / 9
92.386	Probability and Statistics I†	

FOURTH YEAR
FIRST SEMESTER
92.221	Linear Algebra I	3
-.- - -	Computing Requirement (see Program Coordinator)	3
-.- - -	Gen. Ed.- Science with Experimental Learning	3
-.- - -	Gen. Ed.- 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
-.- - -	Gen. Ed.- 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. 92.183 and 92.363 cannot be used as math electives. See an advisor from the College 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 bachelors 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 College 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

The James B. Francis College of Engineering

THE JAMES B. 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 - Environmental Option, B.S.

Civil Engineering Technology - Surveying Option, A.S.

Electronic Engineering Technology, A.S., B.S.

Mechanical Engineering Technology, A.S., B.S.

Mechanical Engineering Technology, Manufacturing Option, B.S.

Mechanical Engineering Technology, Plastics Option, B.S.

CERTIFICATE PROGRAMS:

Computer-Assisted Manufacturing

Computer Engineering Technology

Electronics Technology

Land Surveying

Manufacturing Technology

Plastics Engineering Technology

Wastewater Treatment

Water Treatment

Engineering Technology

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. Engineering technicians or technologists may work in such areas as product sales and distribution, operation service and maintenance, manufacturing and production, and routine design.

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 upon entry into a career.

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.

A.S. IN CIVIL ENGINEERING TECHNOLOGY
YEARS 1-4: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 65

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	Fluid Mechanics/Hydraulics	3
42.102	College Writing II	3
		9

SECOND SEMESTER
15.239	Strength of Materials	3
15.247	Hydraulics Laboratory	1
42.226	Technical and Scientific Communication	3
		7

FOURTH YEAR
FIRST SEMESTER
-.- - -	General Education - Historical Studies	3
15.251	Structural Analysis I	3
15.253	Reinforced Concrete I	3
		9

SECOND SEMESTER
15.257	Highway Elements	3
15.242	Steel Design I	3
15.224	Materials/Structural Lab	1
		7

B.S. IN CIVIL ENGINEERING TECHNOLOGY

YEARS 1-8: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 124

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	Fluid Mechanics/Hydraulics	3
42.102	College Writing II	3
		9

SECOND SEMESTER
15.239	Strength of Materials	3
15.247	Hydraulics Laboratory	1
42.226	Technical and Scientific Communication	3
		7

FOURTH YEAR
FIRST SEMESTER
-.- - -	General Education - Historical Studies	3
15.251	Structural Analysis I	3
15.253	Reinforced Concrete I	3
		9

SECOND SEMESTER
15.257	Highway Elements	3
15.242	Steel Design I	3
15.224	Materials/Structural Lab	1
		7

FIFTH YEAR
FIRST SEMESTER
84.111	General Chemistry I	3
84.113	General Chemistry Lab I	1
15.254	Soil Mechanics I	3
		7

SECOND SEMESTER
15.392	Soil Mechanics II	3
15.383	Steel Design II	3
15.394	Soil Mechanics Laboratory	1
		7

SIXTH YEAR
FIRST SEMESTER
15.356	Water Treatment	3
90.211	Introduction to Programming with C - I	3
-.- - -	Technical Elective	3
		9

SECOND SEMESTER
15.391	Reinforced Concrete Design II	3
15.238	Dynamics	3
15.263	Wastewater Operations Lab I	1
		7

SEVENTH YEAR
FIRST SEMESTER
49.201	Economics I (Microeconomics)	3
17.130	Electrical Basics & Laboratory	2
92.386	Statistics for Science and Engineering	3
		8

SECOND SEMESTER
15.352	Structural Analysis II	3
47.101	General Psychology	3
-.- - -	General Education - Aesthetics	3
		9

EIGHTH YEAR
FIRST SEMESTER
23.414	Engineering Economics	3
-.- - -	General Education - Values, Concepts, and Choice	3
		6

SECOND SEMESTER
15.486	Transportation Elements	3
-.- - -	General Education - Literature	3
		6

B.S. IN CIVIL ENGINEERING TECHNOLOGY: ENVIRONMENTAL OPTION

YEARS 1-8: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 130

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	Fluid Mechanics/Hydraulics	3
42.102	College Writing II	3
		9

SECOND SEMESTER
15.239	Strength of Materials	3
15.247	Hydraulics Laboratory	1
42.226	Technical and Scientific Communication	3
		7

FOURTH YEAR
FIRST SEMESTER
-.- - -	General Education - Historical Studies	3
15.251	Structural Analysis I	3
15.253	Reinforced Concrete I	3
		9

SECOND SEMESTER
15.257	Highway Elements	3
15.242	Steel Design I	3
15.224	Materials/Structural Lab	1
		7

FIFTH YEAR
FIRST SEMESTER
15.131	Environmental Chemistry I	3
15.254	Soil Mechanics I	3
90.211	Introduction to Programming with C - I	3
		9

SECOND SEMESTER
15.132	Environmental Chemistry II	3
15.280	Industrial Waste Treatment	3
15.394	Soil Mechanics Laboratory	1
		7

SIXTH YEAR
FIRST SEMESTER
15.356	Water Treatment	3
15.238	Dynamics	3
15.340	Hazardous Waste Management	3
		9

SECOND SEMESTER
15.358	Wastewater Treatment	3
15.396	Groundwater Resources	3
15.263	Wastewater Operations Lab I	1
		7

SEVENTH YEAR
FIRST SEMESTER
49.201	Economics I (Microeconomics)	3
-.- - -	Technical Elective	3
92.386	Statistics for Science and Engineering	3
		9

SECOND SEMESTER
15.378	Air Quality Management	3
47.101	General Psychology	3
-.- - -	General Education - Aesthetics	3
		9

EIGHTH YEAR
FIRST SEMESTER
15.420	Solid Waste Management	3
23.414	Engineering Economics	3
-.- - -	General Education - Values, Concepts, and Choice	3
		9

SECOND SEMESTER
41.367	Environmental Law and Regulations	3
-.- - -	General Education - Literature	3
		6

A.S. IN CIVIL ENGINEERING TECHNOLOGY: SURVEYING OPTION

YEARS 1-4: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 64

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	Fluid Mechanics/Hydraulics	3
42.102	College Writing II	3
		9

SECOND SEMESTER

15.239	Strength of Materials	3
-.- - -	General Education - Historical Studies	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

degree programs

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.

A.S. IN ELECTRONIC ENGINEERING TECHNOLOGY
YEARS 1-4: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 64

For students entering the program on or after September 2005.

FIRST YEAR
FIRST SEMESTER

42.101	College Writing I	3
92.120	Precalculus Mathematics I	3
43.- - -	General Education - Arts & Humanities (AH)	3
		9

SECOND SEMESTER

42.102	College Writing II	3
92.123	Precalculus Mathematics II	3
90.267	C Programming	3
		9

SECOND YEAR
FIRST SEMESTER

17.213	Circuits I	3
92.125	Calculus A	3
42.226	Technical and Scientific Communication	3
		9

SECOND SEMESTER

17.214	Circuits II and Laboratory	2
92.126	Calculus B	3
99.131	Technical Physics I or Technical Elective	3
		8

THIRD YEAR
FIRST SEMESTER

17.215	Circuits III and Laboratory	2
17.355	Electronics I and Laboratory	2
99.132	Technical Physics II	3
		7

SECOND SEMESTER

17.216	Circuits IV	3
17.356	Electronics II and Laboratory	2
17.354	PSPICE Simulation	3
		7

FOURTH YEAR
FIRST SEMESTER

17.350	Control Systems I	3
17.357	Electronics III & Laboratory	2
17.383	Microprocessors A	2
		7

SECOND SEMESTER

17.353	Digital Electronics	3
17.358	Electronics IV and Laboratory	2
17.384	Microprocessors B	2
		7

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.

B.S. IN ELECTRONIC ENGINEERING TECHNOLOGY
YEARS 1-8: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 126

For students entering the program on or after September 2005.

FIRST YEAR
FIRST SEMESTER

42.101	College Writing I	3
92.120	Precalculus Mathematics I	3
43.- - -	General Education -	3
	Arts & Humanities (AH)	9

SECOND SEMESTER

42.102	College Writing II	3
92.123	Precalculus Mathematics II	3
90.267	C Programming	3
		9

SECOND YEAR
FIRST SEMESTER

17.213	Circuits I	3
92.125	Calculus A	3
42.226	Technical and Scientific	3
	Communication	9

SECOND SEMESTER

17.214	Circuits II and Laboratory	2
92.126	Calculus B	3
99.131	Technical Physics I	3
		8

THIRD YEAR
FIRST SEMESTER

17.215	Circuits III and Laboratory	2
17.355	Electronics I and Laboratory	2
99.132	Technical Physics II	3
		7

SECOND SEMESTER

17.216	Circuits IV	3
17.356	Electronics II and	2
	Laboratory	
17.354	PSPICE Simulation	3
		7

FOURTH YEAR
FIRST SEMESTER

17.350	Control Systems I	3
17.357	Electronics III and	2
	Laboratory	
17.383	Microprocessors A	2
		7

SECOND SEMESTER

17.353	Digital Electronics	3
17.358	Electronics IV and	2
	Laboratory	
17.384	Microprocessors B	2
		7

FIFTH YEAR
FIRST SEMESTER

17.341	Logic Design I and Lab	3
17.365	Applied Linear Devices	3
92.225	Calculus C	3
		9

SECOND SEMESTER

17.361	Project Laboratory A	2
90.268	C++ Programming	3
92.226	Calculus D	3
		8

SIXTH YEAR
FIRST SEMESTER

17.342	Logic Design II and Lab	3
92.234	Differential Equations	3
99.133	Technical Physics III	3
		9

SECOND SEMESTER

17.360	Mathematics and	3
	Statistics/E.E.T.	
17.368	Data Conversion and Lab	2
17.376	Electromagnetic Theory I	3
		8

SEVENTH YEAR
FIRST SEMESTER

17.3/4--	E.E.T. Elective	3
17.3/4--	E.E.T. Elective	3
42.- - -	General Education -	3
	Arts & Humanities (AH)	9

SECOND SEMESTER

17.3/4--	E.E.T. Elective	3
45.- - -	General Education - Arts &	3
	Humanities (AH) (D or E)	
48.- - -	General Education -	3
	Social Sciences (SS) (D or E)	9

EIGHTH YEAR
FIRST SEMESTER

49.201	Economics I (SS)	3
	(Microeconomics)	
17.391	Project Laboratory B	2
		5

SECOND SEMESTER

47.- - -	General Education -	3
	Social Sciences (SS)	
17.392	Project Laboratory C	2
		5

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.

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.

A.S. IN MECHANICAL ENGINEERING TECHNOLOGY

YEARS 1-4: SUGGESTED COURSE OF STUDY

TOTAL CREDITS: 64

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.

FIRST YEAR
FIRST SEMESTER

92.120	Precalculus Mathematics I	3
23.101	Engineering Graphics	2
42.101	College Writing I	3
		8

SECOND SEMESTER

92.123	Precalculus Mathematics II	3
23.102	Engineering Design & Graphics	3
42.102	College Writing II	3
		9

SECOND YEAR
FIRST SEMESTER

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

SECOND SEMESTER

92.126	Calculus B	3
99.132	Technical Physics II	3
23.295	Materials Science	3
		9

THIRD YEAR
FIRST SEMESTER

23.200	Computer Aided Drafting (CADrf)	3
23.221	Statics	3
23.241	Elements of Thermodynamics I	3
		9

SECOND SEMESTER

17.130	Electrical Basics and Lab	2
23.222	Dynamics	3
23.223	Mechanics of Materials	3
		8

FOURTH YEAR
FIRST SEMESTER

23.242	Applied Fluid Mechanics	3
23.202	Thermo/Fluids Laboratory	2
		5

SECOND SEMESTER

17.131	Electronic Basics and Lab	2
-.- - -	General Education - Historical Studies	3
23.302	Mechanics/Materials Lab	2
		7

B.S. IN MECHANICAL ENGINEERING TECHNOLOGY
YEARS 1-8: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 125

FIRST YEAR
FIRST SEMESTER
92.120	Precalculus Mathematics I	3
23.101	Engineering Graphics	2
42.101	College Writing I	3
		8

SECOND SEMESTER
92.123	Precalculus Mathematics II	3
23.102	Engineering Design & Graphics	3
42.102	College Writing II	3
		9

SECOND YEAR
FIRST SEMESTER
92.125	Calculus A	3
99.131	Technical Physics I	3
42.226	Technical and Scientific Communication	3
		9

SECOND SEMESTER
92.126	Calculus B	3
99.132	Technical Physics II	3
23.295	Materials Science	3
		9

THIRD YEAR
FIRST SEMESTER
23.200	Computer Aided Drafting (CADrf)	3
23.221	Statics	3
23.241	Elements of Thermodynamics	3
		9

SECOND SEMESTER
17.130	Electrical Basics and Laboratory	2
23.222	Dynamics	3
23.223	Mechanics of Materials	3
		8

FOURTH YEAR
FIRST SEMESTER
23.242	Applied Fluid Mechanics	3
23.202	Thermo/Fluids Laboratory	2
		5

SECOND SEMESTER
17.131	Electronic Basics and Lab.	2
-.- - -	General Education - Historical Studies	3
23.302	Mechanics/Materials Lab.	2
		7

FIFTH YEAR
FIRST SEMESTER
23.3- -	Mechanical Engineering Technology Elective	3
92.225	Calculus C	3
84.111	General Chemistry I	3
		9

SECOND SEMESTER
17.132	Digital Basics and Laboratory	2
90.211	Introduction to Programming with C - I	3
23.354	Problems in Mechanical Engineering Technology	3
		8

SIXTH YEAR
FIRST SEMESTER
23.320	Machine Design	3
84.113	General Chemistry Lab I	1
23.262	Engineering Data Analysis	3
		7

SECOND SEMESTER
-.- - -	General Education - Aesthetics	3
23.243	Elements of Thermodynamics II	3
-.- - -	General Education - Values, Concepts, and Choice	3
		9

SEVENTH YEAR
FIRST SEMESTER
49.201	Economics I (Microeconomics)	3
23.475	Heat Transfer	3
-.- - -	General Education - Literature	3
		9

SECOND SEMESTER
47.101	General Psychology	3
23.480	Computer-Aided Design (CADes)	3
23.301	Manufacturing Technology Laboratory	2
		8

EIGHTH YEAR
FIRST SEMESTER
23.414	Engineering Economics	3
23.402	Engineering Measurement Laboratory	2
		5

SECOND SEMESTER
23.484	Intro Pro-E	3
23.3- -	M.E.T. Elective	3
		6

B.S. IN MECHANICAL ENGINEERING TECHNOLOGY: MANUFACTURING OPTION

YEARS 1-8: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 125

FIRST YEAR
FIRST SEMESTER
92.120	Precalculus Mathematics I	3
23.101	Engineering Graphics	2
42.101	College Writing I	3
		8

SECOND SEMESTER
92.123	Precalculus Mathematics II	3
23.102	Engineering Design & Graphics	3
42.102	College Writing II	3
		9

SECOND YEAR
FIRST SEMESTER
92.125	Calculus A	3
99.131	Technical Physics I	3
42.226	Technical and Scientific Communication	3
		9

SECOND SEMESTER
92.126	Calculus B	3
99.132	Technical Physics II	3
23.295	Materials Science	3
		9

THIRD YEAR
FIRST SEMESTER
23.200	Computer Aided Drafting (CADrf)	3
23.221	Statics	3
23.241	Elements of Thermodynamics I	3
		9

SECOND SEMESTER
17.130	Electrical Basics & Laboratory	2
23.222	Dynamics	3
23.223	Mechanics of Materials	3
		8

FOURTH YEAR
FIRST SEMESTER
23.242	Applied Fluid Mechanics	3
23.202	Thermo/Fluids Laboratory	2
		5

SECOND SEMESTER
17.131	Electronic Basics and Lab.	2
-.- - -	General Education - Historical Studies	3
23.302	Mechanics/Materials Lab	2
		7

FIFTH YEAR
FIRST SEMESTER
23.3- -	Mechanical Engineering Technology Elective	3
92.225	Calculus C	3
84.111	General Chemistry I	3
		9

SECOND SEMESTER
17.132	Digital Basics and Laboratory	2
90.211	Introduction to Programming with C - I	3
23.301	Manufacturing Technology Lab	2
		7

SIXTH YEAR
FIRST SEMESTER
23.320	Machine Design	3
84.113	General Chemistry Lab I	1
23.262	Engineering Data Analysis	3
		7

SECOND SEMESTER
-.- - -	General Education - Aesthetics	3
23.243	Elements of Thermodynamics II	3
-.- - -	General Education - Values, Concepts, and Choice	3
		9

SEVENTH YEAR
FIRST SEMESTER
49.201	Economics I (Microeconomics)	3
23.475	Heat Transfer	3
-.- - -	General Education - Literature	3
		9

SECOND SEMESTER
47.101	General Psychology	3
23.480	Computer-Aided Design (CADes)	3
23.305	Manufacturing Processes	3
		9

EIGHTH YEAR
FIRST SEMESTER
23.414	Engineering Economics	3
23.402	Engineering Measurement Lab	2
23.416	Statistical Quality Control	3
		8

SECOND SEMESTER
23.419	Computer Aided Manufacturing	3
		3

B.S. IN MECHANICAL ENGINEERING TECHNOLOGY: PLASTICS OPTION

YEARS 1-8: SUGGESTED COURSE OF STUDY
TOTAL CREDITS: 130

FIRST YEAR
FIRST SEMESTER

42.101	College Writing I	3
23.101	Engineering Graphics	2
92.120	Precalculus Mathematics I	3
		8

SECOND SEMESTER

42.102	College Writing II	3
23.102	Engineering Design and Graphics	3
92.123	Precalculus Mathematics II	3
		9

SECOND YEAR
FIRST SEMESTER

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

SECOND SEMESTER

49.201	Economics I (Microeconomics)	3
92.126	Calculus B	3
99.132	Technical Physics II	3
		9

THIRD YEAR
FIRST SEMESTER

23.221	Statics	3
27.371	Plastics Part Design	3
84.121	Chemistry I	3
		9

SECOND SEMESTER

23.222	Dynamics	3
23.241	Thermodynamics	3
84.122	Chemistry II	3
		9

FOURTH YEAR
FIRST SEMESTER

43.___	Historical Elective	3
27.201	Plastics Material Science I	3
84.221	Organic Chemistry I	3
		9

SECOND SEMESTER

17.130	Electrical Basics and Laboratory	2
27.202	Plastics Material Science II	3
27.217	Plastics Processing Eng. Laboratory	1
		6

FIFTH YEAR
FIRST SEMESTER

23.202	Thermo/Fluids Lab	2
23.242	Applied Fluid Mechanics	3
92.225	Calculus C	3
		8

SECOND SEMESTER

27.301	Additives for Polymeric Materials	3
90.211	Intro to Programming with C I	3
92.226	Calculus D	3
		9

SIXTH YEAR
FIRST SEMESTER

23.475	Heat Transfer	3
27.401	Processing Technology I	3
__.___	Values, Concepts, and Choice Elective	3
		9

SECOND SEMESTER

27.402	Processing Technology II	3
__.___	Aesthetics Elective	3
		6

SEVENTH YEAR
FIRST SEMESTER

27.___	Plastics Elective	3
27.___	Plastics Elective	3
__.___	Literature Elective	3
		9

SECOND SEMESTER

27.373	Plastics Mold Design I	3
23.262	Engineering Data Analysis	3
		6

EIGHTH YEAR
FIRST SEMESTER

27.403	Physical Properties of Polymers I	3
27.___	Plastics Elective	3
23.414	Engineering Economics	3
		9

SECOND SEMESTER

27.418	Plastics Product Design	3
27.___	Plastics Elective	3
		6

College of Management

THE COLLEGE OF MANAGEMENT (COM) IS FULLY ACCREDITED AT THE UNDERGRADU-ATE AND GRADUATE LEVELS BY THE AACSB-THE INTERNATIONAL ASSOCIATION FOR MANAGEMENT EDUCATION AND OFFERS A PROGRAM OF STUDY LEADING TO THE BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION (BSBA). FOLLOWING THE AACSB-THE INTERNATIONAL ASSOCIATION FOR MANAGEMENT EDUCATION PHILOSOPHY, THE COLLEGE ENDEAVORS TO CREATE THE INTELLECTUAL CLIMATE REQUIRED TO OFFER A DYNAMIC, HIGH-QUALITY UNDER-GRADUATE EDUCATION IN MANAGEMENT THROUGH A CHALLENGING CURRICULUM.

Associate of Science in Management
Bachelor of Science in Business
  Administration

FOR MORE INFORMATION ON CERTIFICATE PROGRAM DESCRIPTIONS AND REQUIRE-MENTS, SEE PAGE 65 OR VISIT OUR WEB-SITE AT HTTP://CONTINUINGED.UML.EDU.

Management

UMass Lowell offers an Associate of Science in Management and a Bachelor of Science in Business Administration. Each degree offers working professionals an opportunity to develop their skills and become more competitive and confident in the business field. Graduates of the College of Management are offered a higher level of preparedness that differentiates them from competitors, because their quality education is from UMass Lowell, which is an AACSB accredited program. AACSB accreditation guarantees an extensive curriculum that excels because of its commitment to quality and continuous improvement.

A.S. IN MANAGEMENT
YEARS 1-4: SUGGESTED COURSE 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 and Humanities Elective (AH)	3
60.202	Accounting/Managerial	3
		9

SECOND SEMESTER
63.210	Operations Analysis	3
-.- - -	General Education - Arts and Humanities Elective (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 which 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- 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.

B.S. IN BUSINESS ADMINISTRATION

YEARS 1-7: SUGGESTED COURSE 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	9
-.- - -	NON-COM Elective**	

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 and Humanities Elective (AH)†	3
60.202	Accounting/Managerial	3
		9

SECOND SEMESTER
63.210	Operations Analysis	3
-.- - -	General Education - Arts and Humanities Elective (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 which is considered by the University as an unrestricted elective.

***A NON-COM Global Elective is a course outside of the College of Management which 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" Gen. Ed. requirements will be determined by the College.

Note: All BSBA students must successfully complete the required COM filter courses listed below prior to taking any 300- 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.

certificate programs

Certificate Programs: admissions, transfer information and requirements

CERTIFICATE PROGRAMS

UMass Lowell offers a wide variety of credit certificate programs which 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. See pages 23-26 for additional information.

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 which 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 a completed "Petition for the Awarding of a Certificate." 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.

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 the degrees we offer on a part-time, evening basis, visit (http://continuinged.uml.edu/certificates/index.htm)

⇨ Fax the application to (978) 934-4006 or
Mail the application to:
University of Massachusetts Lowell
Enrollment Services/Continuing Studies and Corporate Education
Dugan Hall, Room 104
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 Continuing Studies & Corporate Education at the address above.
*International Students must have their transcripts evaluated by the Center for Educational Documentation.
(http://www.cedevaluations.com)

⇨ Register for courses (http://continuinged.uml.edu)

⇨ Once your application and transcripts have been received, you will receive a confirmation letter from Continuing Studies and Corporate Education.

RECOMMENDED:

⇨ Attend Open House/Orientation (http://continuinged.uml.edu).

⇨ Speak with an academic Faculty and 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. (http://continuinged.uml.edu - click on "Tuition and Fees")

⇨ Become familiar with University policies and regulations in our catalog.

⇨ Contact our staff with any questions at (978) 934-2474, email: Continuing_Education@uml.edu or drop by Southwick Hall Room 202 on UMass Lowell North Monday through Thursday from 8:30 a.m. to 8:00pm and Friday from 8:30am to 5:00 p.m.

CERTIFICATE IN COMPUTER-ASSISTED MANUFACTURING

As the United States focuses on the challenges of global economic competition, one of the key tools for sharpening our competitive edge is the use of the computer as an aid to engineering and manufacturing.

The Certificate Program in Computer-Assisted Manufacturing is designed to provide engineers, technicians, managers and those working in a manufacturing environment with an introduction to the computer as used to enhance industrial competitiveness. Students will apply various popular software packages and work with personal computers.

REQUIRED COURSES (6)

23.101	Engineering Graphics
23.200	Computer Aided Drafting (CADrf)
23.419	Computer Aided Manufacturing
23.480	Computer Aided Design (CADes)
23.484	Intro Pro-E OR
23.485	Intro 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 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: FrontPage®
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: FrontPage®
90.250	E-Commerce on the Web
90.291	Introduction to DHTML
90.460	Computer Ethics
91.113	Exploring the Internet

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 ELECTRONICS TECHNOLOGY

The Certificate Program in Electronics Technology is designed to provide the 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 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 rapidly 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.

The Certificate Program in Graphic Design and Digital Imaging offers students interested in breaking into the field of graphic design and electronic publishing an innovative mix of traditional design courses along with several courses in multimedia, website development, desktop publishing, and more. Students will complete numerous portfolio pieces geared towards the professional market.

Certain courses in this program may also be applied towards the certificates in Multimedia Applications, Website Design & Development, Interactive Game Design, and Technical Writing.

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
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
90.233	Multimedia Authoring Software: Using Macromedia Director
90.238	Website Development: FrontPage
90.247	Web Authoring: Flash MX

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 online course website at http://continuinged.uml.edu/online.

REQUIRED COURSES (2)

90.160	Introduction to Information Systems
90.202	Introduction to Personal Computing and 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: 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 Continuing Studies Course Catalog for computer courses with the 90. prefix, or contact the Faculty and Student Support Center at (978) 934-2474.

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

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.

Many of the courses in this certificate program can be applied towards the B.S. degree in Mechanical Engineering Technology: Manufacturing Option.

REQUIRED COURSES (7)

23.101	Engineering Graphics
23.200	Computer Aided Drafting (CADrf)
23.301	Manufacturing Technology Laboratory
23.305	Manufacturing Processes
23.314	Manufacturing Productivity
23.414	Engineering Economics
23.419	Computer Aided Manufacturing

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 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: Flash MX

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
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®
90.233	Multimedia Authoring Software: Using Macromedia's Director
90.234	Designing and Developing Interactive Media
90.236	Instructional Design for Interactive Media
90.238	Website Development: FrontPage
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 MX (Advanced)
90.348	Developing Dynamic Websites with ColdFusion MX

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 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 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. Some of the courses in this certificate can be applied towards the B.S. Degree in Mechanical Engineering Technology: Plastics Option.

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 or the current Continuing Studies Course Bulletin for a list of available 27.xxx courses.

CERTIFICATE IN SECURITY MANAGEMENT AND HOMELAND SECURITY

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. More than at any other time, corporations are upgrading their existing security systems or contracting with private firms to secure their facilities and provide worker protection. This need is not expected to be short term. Concerns with threats to property and persons in our country will continue to grow in the years ahead. Trends clearly demonstrate increased demand in all aspects of investigative services, perimeter safeguards, surveillance systems, risk management, and armored car services.

The University of Massachusetts Lowell is pleased to announce a new Certificate Program in Security Management and Homeland Security, offered under the auspices of the Criminal Justice Department in concert with Continuing Studies and Corporate Education.

This part-time certificate program 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 this site or refer to the current Continuing Studies Course Bulletin for a list of available on campus courses.

certificate programs

CERTIFICATE IN SPANISH AND LATIN AMERICAN

The Certificate in Spanish and Latin American 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 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, see the Continuing Studies Undergraduate Course Catalog or check our online course listings for computer courses with a 90. OR 92. prefix. For assistance with your course selection, please contact the Faculty and Student Support Center at (978) 934-2474.

certificate programs

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 online course website at ttp://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 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.

Many of the courses in this certificate program can be applied towards the B.S. Degree in Civil Engineering Technology: Environmental Option.

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 WATER TREATMENT

Due to the 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. Many of the courses in this certificate program can be applied towards the B.S. Degree in Civil Engineering Technology: Environmental Option.

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 WEBSITE DESIGN AND DEVELOPMENT

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 Mac OS and/or Windows familiarity. Not all of the courses in this program are available on both Mac and PC platforms or in the online format. Please refer to the current semester course listings to see whether a course is offered in a Mac or PC 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
90.247	Web Authoring: Flash MX
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: FrontPage®
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 MX (Advanced)
90.348	Developing Dynamic Websites with ColdFusion MX

WEB DEVELOPMENT TRACK

REQUIRED COURSES (4)

90.291	Introduction to DHTML
90.238	Website Development: FrontPage®
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: Flash MX
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 MX (Advanced)
90.348	Developing Dynamic Websites with ColdFusion MX

*Note: Other 90.xxx courses may be substituted as electives for the Web Development Track with prior approval from the certificate program coordinator.

course descriptions

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.
Banking 69.
Biological Sciences 81./83.
Chemistry 84./86.
Civil Engineering Technology 15.
Client/Server 90./92.
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./90.
Hazardous Waste
    Management 15./41./86.
History 43.
Information Technology 90./91./92.
Interdisciplinary Courses 59.

Internet 70./90./91.
Interactive Game Design 70./90.
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.
Quality Assurance 23.
Sociology 48.
Technical Writing 42.
UNIX Systems 92.
Water/Wastewater Treatment 15./86.
Website Design &
    Development 70./90./91.

15.113 COMPUTER-AIDED DESIGN AND DRAFTING

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. 2 credit(s). 3 hours lab. Prerequisite: 23.101 or related experience.

15.114 3D CAD

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. 2 credit(s). 3 contact hours. Prerequisite: 15.113 or equivalent.

15.123 SURVEYING I

Basic principles of surveying: use, care, and adjustments of tape, engineers transit, engineers level, theodolite and electronic distance measuring devices; introduction to surveying processes by means of traverse computations, development of topographic information, introduction to global positioning systems, elementary photogrammetry, the Internet, and the use of the electronic computer in land surveying. Problems are used to illustrate basic principles. 4 credit(s). 6 contact hours (lecture and lab). Prerequisite: 92.123, 23.101.

15.124 SURVEYING II

Basic principles of route designing and surveying. An introduction to the preparation of calculations and plans for the construction of all routes of transportation. Class topics include route geometry determination, curve geometry, economic analysis using cost to benefit rationale. Determination of earthwork quantities and the use of the electronic computer in route surveying. Problems are used to illustrate basic principles. 4 credit(s). 3 hours lecture and 1 hour lab. Prerequisite: 15.123.

15.131 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. 3 credit(s). SL

15.132 ENVIRONMENTAL CHEMISTRY II

Serves as a continuation of 15.131. 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. 3 credit(s). Prerequisite: 15.131. SL

15.152 WATER BIOLOGY

Covers the following topics: uses of biology lab tools; microscope basic chemistry; water molecules; physical properties; biochemistry; life functions; features of life and the cell; classification; viruses and monerans; simple water animals; simple water plants; protists and fungi; methods of transport, osmosis, diffusion, etc.; photosynthesis, respiration, ecosystems, and biomes. 3 credit(s).

15.224 MATERIALS/STRUCTURAL LABORATORY

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. 1 credit(s). 3 contact hours. Prerequisites: 15.251, 15.253.

15.237 STATICS

Basics of Mechanics is developed to establish the principles of statics. Forces and their effects on objects in equilibrium are discussed and analyzed. Concepts are used to determine forces on beams, truss analysis, and shear and moment diagrams. Structual supports and their corresponding reactions are studied to initate beam analysis. Problems are used to demonstrate the basic principles. This course is a combined section with MET. 3 credit(s). Prerequisite: 92.125, 99.131.

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. This course is part of the required curriculum for both Mechanical Engineering Technology (MET) students and Civil Engineering Technology (CET) students. This course is also necessary for any student wishing to pursue additional study in fluid dynamics, structural dynamics, vibration analysis, and earthquake engineering. 3 credit(s). Prerequisites: 92.125, 92.126, 23.221.

15.239 STRENGTH OF MATERIALS

Presents stress and deformation analysis of bodies under axial, torsional, flexural, and combined loading. Also covered are principal stresses, Mohr's stress circle, strain, temperature effects, and shear and moment diagrams. 3 credit(s). Prerequisite: 92.126, 23.221, 23.295.

15.242 STEEL DESIGN I

Provides an introduction to the analysis and design of structural steel elements based on AISC LRFD code requirements. Structural elements covered include tension members, columns, beams, and beam columns. Types of structures considered include simple and continuous spans, and braced and unbraced frames. Strength, serviceability, design economy and good design practice principles are discussed. Use of computer software to perform routine analysis and design tasks is reviewed and examples provided. 3 credit(s). Prerequisite: 15.237 and 15.239.

15.246 HYDRAULICS

Presents the properties of fluids, principles of hydrostatic pressure, fluid flow with applications to orifices, tubes, wires, and pipes. Two demonstration laboratory sessions will be held during the semester. 3 credit(s).

Prerequisite: 15.237 or 23.221.

15.247 HYDRAULICS LABORATORY

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. 1 credit(s). 3 contact hours. Prerequisite: 15.246.

15.251 STRUCTURAL ANALYSIS I

Presents methods of analysis of statically determinate structures. Deflection calculations for beams, trusses, and frames are presented using moment-area theorem, conjugate beam method, and virtual work. Analysis of beams, trusses and frames by energy methods is covered. Slope deflection and moment distribution for beams and frames is presented. The solution of trusses and frames by a general purpose structural analysis computer program is also presented. 3 credit(s). Prerequisite: 15.239.

15.253 REINFORCED CONCRETE I

Presents the selection and design of reinforced concrete members to resist axial, shearing, bending and combined stresses by the working stress design method and the strength method. Design of rectangular beams, T-beams, and slabs will also be discussed. Use of current ACI specification and commentary is also covered. 3 credit(s). Prerequisite: 15.239.

15.254 SOIL MECHANICS I

Provides an elementary treatment of the physical properties of soil, such as bearing capacity, shearing strength, seepage, soil pressure, and settlement. Also covers subsurface investigation and the application of soil properties to soil classifications. 3 credit(s). Prerequisite: 15.239.

15.256 WATER AND WASTEWATER LABORATORY

Laboratory study of basic lab techniques and procedures, water chemistry, turbidity, odor, pH, taste, harness, alkalinity, jar testing, BOD, COD. 1 credit(s). 3 contact hours.

15.257 HIGHWAY ELEMENTS

Provides an introduction to the broad field of highway design and engineering, including planning, evaluation, vehicle/driver/traffic characteristics, geometric design, drainage, earthwork, materials and pavement types, construction, and maintenance. Included are discussions of the layout and design of various facilities; the effects of government policies on highways; the possible social, economic, and environmental effects of highway facilities; and current events in transportation, such as Boston's Central Artery/Third Harbor Tunnel Project. 3 credit(s). Prerequisite: 15.124.

15.261 WASTEWATER TREATMENT PLANT OPERATIONS I

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. 3 credit(s). Corequisite: 15.263.

15.262 LEGAL ASPECTS OF LAND SURVEYING

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. Students will learn a proven method of how to gather and organize property line information at Registries of Deeds and Probate, and how to present this information in an efficient manner to the field crew and the person responsible for the final property line determination. Students will also learn about the use of other sources of property line information found at municipal offices, local museums and archives, and the Massachusetts Land Courts. Special responsibilities that land surveyors have in establishing property lines on land abutting tidelands, tidal rivers, streams and great ponds will also be covered. 3 credit(s). Prerequisite: 15.123.

15.263 WASTEWATER OPERATIONS LABORATORY I

Serves as an introductory course, teaching the basic laboratory techniques and procedures used to operate and monitor biological wastewater treatment facilities. This is a hands-on laboratory where students work individually or in small groups performing wet chemistry analyses on wastewater samples. 1 credit(s). 3 contact hours. Corequisite: 15.261, 15.356 or 15.358.

15.272 WATER SUPPLY AND TREATMENT OPERATIONS I

Provides an introduction to the principles and practices of operation and maintenance relative to drinking water supplies and treatment plants. Using case studies, the following topics are covered: sources of supply, well and reservoir operation, contaminants and regulation, hazardous materials, overview of treatment, chemical feeding, coagulation, settling, operating conditions, filtration, solids handling, disinfection, chlorination, and fluoridation. 3 credit(s).

15.274 WATER WORKS OPERATIONS LAB I

Introduces the students to fundamental laboratory equipment as applied to the operation of water treatment facilities. The following determinations will be conducted: odor, color, turbidity, jar tests, pH, chlorine residual, acidity, alkalinity, hardness, chlorine, iron, manganese, phosphate, aluminum, nitrogen, cycle, coliform, microscopic analysis, heavy metals, and organics. 1 credit(s). 3 contact hours.

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 presented. 3 credit(s).

15.299 SURVEYING III

Introduction to geodesy; geographic coordinates (latitude and longitude); State Plane Coordinate System of 1983 (Lambert Conformal Conic Projection and Transverse Mercator Projection); field astronomy for celestial observations (including the use of any ephemeris to determine astronomic north from observing the sun, Polaris, the North Star), and various other stars. Error theory (precision and accuracy, probability curves, standard error and other statistics, propagation of errors in surveying, sources of error). Field method of determining accuracy and precision of Electronic Distance Measuring (EDM) devices. 3 credit(s). Prerequisite: 15.124 or experience as a land surveyor.

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. 3 credit(s). Prerequisite: 15.113.

15.340 HAZARDOUS WASTE MANAGEMENT

Review of history of hazardous waste management in the United States. Discusses waste accumulation, storage and disposal options, pollution prevention, environmental auditing, remediation and cleanup, underground storage tank management, and chemical life-cycle tracking. 3 credit(s).

15.352 STRUCTURAL ANALYSIS II

Presents methods of analysis of statically determinate structures. Deflection calculations for beams, trusses, and frames are presented using moment-area theorem, conjugate beam method, and virtual work. Analysis of beams, trusses, and frames by energy methods is covered. Slope deflection and moment distribution for beams and frames is also presented. The solution of trusses and frames by a general purpose structural analysis computer program is also presented. 3 credit(s). Prerequisite: 15.251.

15.353 FORENSIC ENGINEERING

Scope of study includes design, remediation, and forensic investigative skills necessary to give insight into the behavior and analysis of structures and machine operations. Areas of analysis include cause of failure, evaluation of damage, and recommendations for repair from events such as collapse, construction defect, expansive soil, explosion, fire, snowstorm, wind, hail, tornadoes, vehicular impact and water leak. Forensic engineers including structural, mechanical and electrical engineering coordinate with architects, attorneys, contractors developers, owners, property managers and insurance companies to provide explanation for the origin and cause of damage to property and the recommended means to salvage and repair a loss.3 credit(s). CET/MET elective

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. 3 credit(s).

15.356 WATER TREATMENT

This course is a concept/design course. All types of modern water treatment methods are presented. Approximately 35% of the class is directed toward surface water treatment including: intakes, rapid mix, coagulation/flocculation, sedimentation, filtration, disinfection. Approximately 30% is targeted to methods more used for commercial and industrial applications including: ion exchange, reverse osmosis, electrodialysis, ozone, ultraviolet. Approximately 15% focuses on the EPA Safe Drinking Water Act. The remaining 20% discusses projecting populations, per capita demand, sizing dams and rating watershed safe yield, chemical field equipment and SCADA. 3 credit(s). Prerequisite: 15.246 and 15.131.

15.358 WASTEWATER TREATMENT

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. 3 credit(s). Prerequisite: 92.110, 15.356.

15.361 WASTEWATER TREATMENT PLANT OPERATIONS II

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. 3 credit(s). Prerequisites: 15.261, 15.263. Corequisite: 15.363.

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. 1 credit(s). 3 contact hours. Prerequisite: 15.261, 15.263. Corequisite: 15.361.

15.372 WATER SUPPLY AND TREATMENT OPERATIONS II

Serves as a continuation of 15.272, covering the following topics: corrosion control, oxidation, and aeration, use of ozone, chlorine dioxide and potassium permanganate, iron and manganese, carbon softening, instrumentation and control, system contamination and control, reverse osmosis, ultra filtration, electrodialysis, distillation and UV, and energy management. 3 credit(s). Prerequisite: 15.272.

15.374 WATER WORKS OPERATIONS LAB II

This hands-on lab has the students working in small groups (2-3 people) and doing wet chemistry analyses on the following: fluoride, fecal coliform, phosphate, algae, and microscopic analyses, filterability, TKN, TOC, heavy metals with AA apparatus, activated carbon assessment, and laboratory quality assurance. 1 credit(s). 3 contact hours. Prerequisite: 15.274.

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, CO_2, SO_2, Nox, CO, and particulate monitors. 3 credit(s). 1 hour lecture, 2 hours lab. Prerequisite: 15.131.

15.383 STEEL DESIGN II

A continuation of 15.242 using LRFD approach for the analysis and design of building structural steel elements. Focus is on general bolted and welded connections and building shear-type connections. Analysis and design of building composite floor systems is also covered. Comparison is made between traditional analysis design methods and use of computer software. 3 credit(s). Prerequisite: 15.242.

15.388 PUMPS AND COMPRESSORS

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. 3 credit(s). Prerequisite: General mathematics and basic knowledge of hydraulics.

15.391 REINFORCED CONCRETE DESIGN II

A continuation of 15.253. Provides an introduction to the analysis and design of reinforced concrete ele-

ments based on ACI code requirements. Structural members, covered include wall and column footings, cantilever retaining walls, bearing and shear walls, two-way flat plate slabs, torsion members, and framework. 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. 3 credit(s). Prerequisite: 15.253.

15.392 SOIL MECHANICS II

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. 3 credit(s). Prerequisite: 15.254.

15.394 SOIL MECHANICS LAB

Presents common soil laboratory tests including soil classifications, Atterberg limits, strength and compressibility tests. 1 credit(s). Prerequisite: 15.254.

15.396 GROUNDWATER RESOURCES

Provides an introduction to the basic concepts of groundwater hydrology, starting with a discussion of the origin and occurrence of groundwater and progressing to the hydrologic cycle, aquifers, and basic geology as applied to groundwater hydrology. Essential concepts of groundwater hydrology will be covered, including Darcy's law, aquifer parameters, gradients, and flownets. The final third of the course will cover methods of determining aquifer hydrologic properties, including a review of field investigation methods, wells, and aquifer test concepts and procedures. 3 credit(s).

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. 3 credit(s).

15.420 SOLID WASTE MANAGEMENT

Examines science, engineering and management issues pertaining to the collection, treatment and disposal of municipal solid wastes. Municipal waste quantification, characterization and generation patterns are reviewed as an introduction to this course. Design and operation of waste collection systems is covered. Modern land filling technologies which utilize landfill liners and capping systems are described. The issues of reuse and recycling of waste constituents and community composting for the disposal of biodegradable materials are presented as an alternative to land filling. The mechanical, chemical, and operational aspects of modern combustion processes such as engineered incineration systems are covered in detail. 3 credit(s).

Prerequisite: Jr. status.

15.452 OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS

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. 3 credit(s).

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. 3 credit(s). Prerequisite: Senior status.

15.486 TRANSPORTATION ELEMENTS

[Description to come.] 3 credit(s). Prerequisite: 15.257

15.492 WATER/WASTEWATER PLANT MANAGEMENT

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. 3 credit(s).

17.130 ELECTRICAL BASICS AND LABORATORY

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. Alternate lecture and laboratory sessions. 2 credit(s). 3 contact hours. Prerequisite: 92.125; not available for E.E.T. majors.

17.131 ELECTRONIC BASICS AND LABORATORY

Serves as a continuation and elaboration of 17.130. Topics include: diodes; transistors and electronic amplifiers; power supplies; and feedback and control systems. Magnetics and electromechanics, AC power systems. Further use of laboratory equipment, function generators, power supplies, DMM and oscilloscope will be demonstrated. Written reports are required. Alternate lecture and laboratory sessions. 2 credit(s). 3 contact hours. Prerequisite: 17.130. Not available for EET majors.

17.132 DIGITAL BASICS AND LABORATORY

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 avail-able in the laboratory and their use is expected. Written reports are required. Alternate lecture and laboratory sessions. Not available for EET majors. 2 credit(s). 3 contact hours. Prerequisite: 17.130; not available for E.E.T. majors.

17.200 BASIC GEOMETRICAL OPTICS

Geometrical imaging with optical elements, flux throughput, throughput relations, image quality considerations, applications of design concepts. 3 credit(s). Prerequisite: Algebra and trigonometry background.

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. 3 credit(s). Prerequisite: Algebra and trigonometry background.

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. 3 credit(s). Prerequisite: Algebra and trigonometry background.

17.210 SEMICONDUCTOR BASICS

Overview of material's mechanical, chemical, and electronic properties including material structures, bonding, and Miller indices. Hybridization of energy levels and semiconductor phenomenon. Intrinsic as well as extrinsic, generator of electrons and holes, and basic conduction in semiconductors. Basic devices such as p-n junction and Schottky barrier diodes, BJTs, MOS devices, and ICs. Introductory processing essential for fabricating semiconductor devices and ICs such as oxidation, photo lithography, development, and etching, diffusion, ion implantation, and metallization along with characterization and testing at each stage. Packaging and reliable manufacturing for better yield. Clean room environment and defect-free manufacturing of semiconductors and VLSI chips with demonstrative illustrations. 3 credit(s). 3 contact hours. Prerequisite: 91.123.

17.213 CIRCUITS I

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. 3 credit(s). Prerequisite: 92.125 (May be taken concurrently), 90.267.

17.214 CIRCUITS II AND LABORATORY

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. 2 credit(s). 3 contact hours. Prerequisite: 17.213.

17.215 CIRCUITS III AND LABORATORY

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 resonance, parallel resonance and transformers. Filters, 2-port networks, computer aided circuit analysis (SPICE). Computer terminals will be available in the laboratory and their use is expected. Written reports are required. Alternate lecture and laboratory sessions. 2 credit(s). 3 contact hours. Prerequisite: 17.214.

17.216 CIRCUITS IV

Circuits IV 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 duals 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. 3 credit(s). Prerequisite: 17.215.

17.230 MATHEMATICS AND STATISTICS/E.E.T.

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. 3 credit(s). Prerequisite: 17.350, and either 92.265 or 90.267.

17.300 BASIC PHYSICAL OPTICS

Diffraction optics, Gaussian beams, crystals and thin films, scanning systems, optical design practices. 3 credit(s). Prerequisite: Assumes some calculus and 17.200 or instructor permission.

17.301 MATH FOR SIGNAL PROCESSING

This is an overview course on many topics in mathematics and does not attempt to cover the breadth and depth of each topic but rather attempts to cover pertinent aspects of each topic that should be familiar or at least learnable. Class goals: to serve as a refresher course on materials that students may have seen before, but have either forgotten or didn't understand the first time around; to pique the student's interest in taking a more formal mathematics course on subjects covered iin this course; to ascertain, in a physical sense, some understanding and justification on the material covered in this course; to find applications on the material covered specific to signal processing and photonics. 3 credit(s).

17.302 WAVE OPTICS

Beam focusing, imaging and wave optics, interference, filters, etalons, diffraction, scattering and coherence, polarization, reflections, index ellipsoid, anisotropic media, propagation in crystals, electro-optic effects. Material from 17.200 and 17.300. 3 credit(s). Prerequisite: 17.301.

17.322 SIGNALS AND SYSTEMS I

Introduction to signals and systems. Signal classification: continuous vs. discrete; deterministics vs. random. Normalized energy and power. Signal families, complex exponential, step impulse. Systems: time-domain representation by differential equations; linear time invariance; classical solution to various signal families; frequency domain representation by system function $H(s)$; total solution of system with initial conditions using $H(s)$. Block-diagram representation of systems and differential equations. Impulse and pulse response of LTI systems. Convolution methods; properties, scanning with impulses, convolution algebra. Fourier series analysis of systems with periodic inputs; properties, spectra and series development with impulse method. Fourier transforms; properties, energy and power signals, response of ideal and non-ideal filters. Nyquist's sampling theorem and its application. Laplace transform, properties and use, inversion by partial fractions, resides with s-plane vectors, application to LTI systems with initial conditions and sources. Introductions to digital elements and equations. 3 credit(s). Prerequisite: 92.234 and permission of instructor.

17.323 SIGNALS AND SYSTEMS II

This course, employing probabilistic methods of signal and system analysis (an extension of 17.322), 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 to verify theory and to learn the important technique of simulation. Applications of theory to manufacturing and reliability, noise analysis, spectral analysis, data communi-

cation, data collection, and system design will be presented. 3 credit(s). Prerequisite: 17.322.

17.324 ENGINEERING MATHEMATICS

Complex numbers, 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. 3 credit(s). Prerequisite: 92.234.

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 mutli-level combinational circuits. Gate conversion. Decoders, encoders, multiplexers, and demultiplxers. Programmable logic devices: read-only memories, programmable logic arrays, and programmable array logic. 3 credit(s). Prerequisite: 17.214.

17.342 LOGIC DESIGN II AND LABORATORY

This course studies synchronous sequential circuits and register transfer logic. Latches and flip-flops. Registers. Counters. Analysis and design of synchronous sequential circuits. Moore model and Mealy model. Two's complement arithmetic. Algorithmic state machine (ASM) chart. One-hot state assignment. Register transfer logic. Data-path and control circuit. Design of a simple arithmetic processor. 3 credit(s). Prerequisite: 17.341.

17.346 LOGIC DESIGN A (REPLACED BY 17.341)

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. 3 credit(s). Prerequisite: 17.355.

17.347 LOGIC DESIGN B (REPLACED BY 17.342)

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; implication graphs; fundamental mode asynchronous sequential networks; and flow tables, cycles, races, and critical race-free assignments. 3 credit(s). Prerequisite: 17.346.

17.348 LOGIC DESIGN C & LABORATORY (REPLACED BY 17.342)

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. 2 credit(s). 3 contact hours. Prerequisite: 17.347, 17.353.

17.350 CONTROL SYSTEMS I

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. 3 credit(s). Prerequisite: 17.216

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. 3 credit(s). Prerequisite: 17.356, 17.346.

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 dependant 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 reinforced by homework which will then be applied in the PC lab. 3 credit(s). 3 contact hours.

17.355 ELECTRONICS I & 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. 2 credit(s). 3 contact hours. Prerequisite: 17.215 and 42.226.

17.356 ELECTRONICS II & LABORATORY

This course surveys the operating characteristics of bipolar junction transistors (BJTs); circuit symbols; nonlinear, large-signal behavior of BJTs; operational amplifiers and analyses; and their application in actual circuits. Large-signal, piecewise, linear DC BJT circuits and small-signal AC BJTs will be studied. This course covers BJTs as used in amplifiers, switches cutoff, and saturation. P- and N-channel MOSFETs and junction field-effect transistors (FETs) will be introduced and discussed. These include linear, small-signal AC models. Examples and homework, based on present-day applications, are designed to provide practice in the use of fundamental concepts and applications. 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, which augment coverage in the text. 2 credit(s). 3 contact hours. Prerequisite: 17.355.

17.357 ELECTRONICS III & 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 topoics. Differential amplifiers and frequency response of different types of amplifiers will be discussed. After taking this course a student should be able to design and analyze different types of multi-stage amplifiers. They will be able to know the frequency response of such amplifiers. Examples and homework, based on present day applications, are designed to provide practice in the use of fundamental concepts and applications. 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. 2 credit(s). 3 contact hours. Prerequisite: 17.356.

17.358 ELECTRONICS IV & LABORATORY

Feedback, 4 topologies, method of analysis (Experiment 1 - Verify feedback equation of 3-stage amplifier). Amplifier stability, phase and gain margin, compensation (Experiment 2 - Effects of feedback on frequency response). Sinusoidal oscillators (Experiment 3 - Wienbridge oscillator). Active filters -

Butterworth, Chebychev filter specifications (Experiment 4- Active filter design). A/D converters D/A converters. SPICE simulations are required for most experiments. 2 credit(s). 3 contact hours. Prerequisite: 17.357.

17.360 MATHEMATICS AND STATISTICS/E.E.T.

Uses the computer to apply mathematics, probability and statistics to technological problems. Topics include: probability, statistics, regression, correlation, goodness of fit, variance, probability distributions and the computer solution of algebraic equations associated with multivariable statistical problems. 3 credit(s). Prerequisite: 17.350 and either 92.265 or 90.267.

17.361 PROJECT LABORATORY A

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the 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. 2 credit(s). 3 contact hours. Prerequisite: 17.353, 17.358 and 17.365 - may be substituted with 17.354.

17.365 APPLIED LINEAR DEVICES

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. 3 credit(s). Prerequisite: 17.350 and 17.357.

17.368 DATA CONVERSION AND LABORATORY

Teaches the fundamentals of data conversion including digital to analog converters (DACs) using R/2R ladder networks, analog to digital converters (ADCs), 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, and phase-locked loops. 2 credit(s). 3 contact hours. Prerequisite: 17.346 or 17.371.

17.376 ELECTROMAGNETIC THEORY 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. 3 credit(s). Prerequisite: 17.213, 17.214, 92.234.

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 address-

ing; 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. 2 credit(s). 3 contact hours. Prerequisite: 17.346 or 17.371.

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. 2 credit(s). 3 contact hours. Prerequisite: 17.383.

17.391 PROJECT LABORATORY B

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the 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. 2 credit(s). 3 contact hours. Prerequisite: 17.361, or 17.353 and 17.358 and 17.365, and at least one 17.4-- E.E.T. elective. May do project at work (all requirements of reports, presentation, etc. still required).

17.392 PROJECT LABORATORY C

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the 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. 2 credit(s). 3 contact hours. Prerequisite: 17.361, or 17.353 and 17.358 and 17.365, and at least one 17.4-- E.E.T. elective. May do project at work (all requirements of reports, presentation, etc. still required).

17.415 ADVANCED TOPICS IN OPTICAL ENGINEERING

Examples include nonlinear optical devices and integrated optical circuitry. 3 credit(s).

17.419 INTRODUCTION TO ITS TECHNOLOGIES

The course introduces students to the technologies collectively known as Intelligent Vehicle Highway Systems (IVHS), including communications, controls, navigation and computer applications, safety and collision avoidance, and transmission media from acoustic waves to microwaves. It covers prospects for the future development of IVHS and discussion of systems engineering and technical experience needed to design a national transportation system architecture. The course explores new cooperative and interactive approaches among engineers and vehicle manufactur-

ers to solve technical problems posed by implementing IVHS. It includes discussion of IVHS America, the historic background of transportation, public and private transportation issues, technical and traffic management issues, and areas of product development and applications, particularly for defense contractors. It will give managers technical vocabulary enabling them to make informed choices on managing education in the field. Included is discussion of career areas involving IVHS. 3 credit(s).

17.427 DIGITAL SIGNAL PROCESSING

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. 3 credit(s). Prerequisite: 17.353, 92.234, 90.267.

17.428 VACUUM TECHNOLOGY AND RF

Vacuum technology, gas characteristics and gas flow, pumps, gauges, vacuum materials, cleaning, leak detection, vacuum systems; electromagnetic radiation, amplifiers, transmission lines, plasmas, RF generation. 3 credit(s).

17.431 ELECTROMAGNETIC COMPATIBILITY

Provides a working knowledge of electromagnetic interference (EMI) and electromagnetic compatibility (EMC), while illustrating actual interference situations and their solutions. This course will cover the characteristics of conducted and radiated interference and electromagnetic pulse (EMP) effects. Interference coupling mechanisms will be considered. Solutions to interference problems based on grounding, shielding and filtering techniques will be discussed. Emphasis will be placed on practical design procedures. Design issues regarding intersystem interference will be addressed. The course will also cover industrial and government standards, as well as EMC measurement and test procedures. 3 credit(s). Prerequisite: 17.376.

17.433 LINEAR FEEDBACK SYSTEMS

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. 3 credit(s). Prerequisite: 17.324.

17.443 PHOTOVOLTAICS

An introductory course in photovoltaics concentrating on solar cells for energy conversion. Solar radiation and conversion efficiency. Photovoltaic materials, energy bands and carrier transport, semiconductors and conductors. P-n junctions, depletion region, cur-

rent voltage characteristics, efficiency. Heterojunctions and thin film solar cells. Balance of system components for a photovoltaic system including electrical storage. Barrier to extensive use of photovoltaic systems. 3 credit(s). Prerequisite: 17.214, 92.126.

17.447 FIBER OPTIC NETWORKS

Losses and dispersion in fibers, links, power budgets, dynamic range, optical amplifiers, single wavelength networks and standards, detectors, PIN, APD, performance, semiconductor lasers, modulation and stabilization, temperature effects, reliability, laser drivers, noise analysis, linearity, BER, eye pattern analysis. 3 credit(s). Prerequisite: 17.301, 17.302, 17.479.

17.449 LOGIC DESIGN D

Serves as a continuation of 17.347 or 17.372. Pulse mode asynchronous networks, iterative networks, the structure of sequential networks, sets, relations and lattices, state assignment using partitions, serial and parallel decomposition, decomposition with specified components, state identification and fault detection experiments, linear sequential networks and applications of digital logic are all addressed in this course. 3 credit(s). Prerequisite: 17.347 or 17.372.

17.459 POWER CONVERSION I

Power supply design is introduced starting with a simple half wave and full wave rectifier capacitor filter power supply. 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 as output voltage tolerance, feedback control is introduced using linear regulator. Circuit elements which effect regulation are explored and the improvements in regulation through regulator gain is demonstrated. Protection circuits, regulator efficiency and thermal design are also introduced. The high frequency switching forward conversion topologies are explored, detailing the output filter design and its 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. 3 credit(s). Prerequisite: 17.360, 17.365.

17.460 POWER CONVERSION II

Forward converter topologies are reviewed and core selection equations are developed from magnetic fundamentals, power and winding requirements. Transformer design and winding layups are studied for their effects on eddy currents, proximity effect and AC resistance. Drive requirements and circuits are investigated for both BJT's and MOSFET's along with snubber circuits. 3 credit(s). Prerequisite: 17.350, 17.365, 17.459.

17.461 LASERS AND LASER SYSTEMS

Quantum concepts, resonator design, theory of lasers, power levels, Q switching and mode-locking, operation and performance of commonly used lasers, semiconductor lasers, applications. 3 credit(s). Prerequisite: 17.479 or permission of instructor.

17.462 IMAGE SIGNAL PROCESSING

Provides an introduction to image signal processing and its mathematical fundamentals. Sensors, data formation, storage and access are considered. Data processing is divided into two and three dimensions. Two dimensional topics include image processing, region processing, and object recognition. Three dimensional topics include contours, lines, shading, and colors. Stereo, motion, and surface representation are also considered. Image files with halftoning are provided for class assignments. 3 credit(s). Prerequisite: 17.479.

17.463 BIOMEDICAL OPTICS

Interaction of laser radiation with tissue, laser safety and hazards, fiber delivery systems, laser catheters and endoscopes, optical biopsy, imaging through tissue, medical thermal imaging, optical fiber sensors, angioplasty, photochemotherapy, ophthalmology. 3 credit(s). Prerequisite: 17.479 or permission of instructor.

17.464 INDUSTRIAL OPTICS

Optical inspection, interferometry, laser inspection, thermal inspection, acoustic inspection, X-ray inspection, image processing, automated inspection processes; theme running through course could be device and board level inspection. 3 credit(s). Prerequisite: 17.479 or permission of instructor.

17.465 INFRARED OPTICAL SYSTEMS

Sources, backgrounds, and detector types, IR signature calibration procedures, signature characterization and camouflage, optical design for the infrared and IR imaging, performance and components of IR systems, testing of IR detectors and subsystems; infrared imaging system testing; minimum resolvable and detectable temperatures, infrared focal plan arrays, performance analysis, infrared transmitting fiber optics. 3 credit(s).

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. 3 credit(s). Prerequisite: 17.350.

17.474 INFRARED OPTICAL SYSTEMS

Sources, backgrounds and detector types, IR signature calibration procedures, signature characterization and camouflage, optical design for the infrared and IR imaging, performance and components of IR systems, testing of IR detectors and subsystems; infrared imaging system testing; minimum resolvable and detectable temperatures, infrared focal plan arrays, performance analysis, infrared transmitting fiber optics. 3 credit(s).

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. 3 credit(s). Prerequisite: 17.376 and 92.234.

17.478 APPLIED ELECTROMAGNETICS

Presents the conventional two-conductor transmission line theory with emphasis on those results which can be applied to the analysis and design of waveguide transmission. A discussion of the most frequently used microwave oscillators, the magnetron and klystron, is presented. The traveling wavetube concept is also emphasized. The interaction of microwave radiation with magnetic materials and practical devices of importance will be studied. Special problems encountered when microwave techniques and methods are extended to the millimeter-wavelength limit of the microwave domain will be reviewed. 3 credit(s). Prerequisite: 17.477.

17.479 ELECTRO-OPTICS

Optical radiation, lasers, light modulators, detectors, fiber optic elements and systems. 3 credit(s). Prerequisite: 17.300 or permission of instructor.

17.480 ELECTRO-OPTICS LABORATORY

Basic imaging experiments, diffraction experiments, introduction to use of lasers, modulators and detectors, optical systems design using Lens Design software, optical fibers. 2 credit(s). 3 contact hours. Prerequisite: 17.479 or instructor permission.

17.481 ADVANCED TOPICS IN PHOTONICS

Nonlinear effects in fibers, fiber gratings, dispersion and soliton links, SHG and frequency mixing, optical mixing, parametric amplification and stimulated Brillouin scattering, WDM, multiplexers, nonlinear effects and passive optical networks, RF photonics and electroabsorption modulators, micro-optical electromechanical machines (e.g. Lucent Lambdo router) 3 credit(s). Prerequisite: 17.479.

17.483 MICROPROCESSOR HARDWARE

Provides an introduction to the design of a 16 bit microprocessor system. The hardware requirements of interfacing the 8086 microprocessor to memory devices, EPROMs, dynamic RAMs and static RAMs as well as I/O devices are covered. The interface to the various microprocessor peripherals such as the Coprocessor, Bus Arbiter, DMA Controller, Programmable Interrupt Controller, and Dynamic Ram Controller is investigated. The 8086 system is compared to the 68000 system. 3 credit(s). Prerequisite: 17.348 or 17.367, and either 17.383 or 17.384.

17.484 MICROPROCESSOR SOFTWARE

Presents a study of the architecture and instruction set of the 8086 microprocessor. Subject areas include: addressing modes, data movement instructions, flag operations, arithmetic and logical instructions, bit manipulation instructions, primitive string operations, program control instructions, hardware control instructions, interrupt structures and procedures. Programming in the DOS environment and the ROM BIOS will be covered. Students will be required to develop programs that exhibit their knowledge of both the instruction sets and good programming practices. The interpretation of written programs will also be investigated. 3 credit(s). Prerequisite: 17.348, and either 17.383 or 17.384.

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. 3 credit(s). Prerequisite: 17.376, 92.132.

17.486 DIGITAL COMMUNICATIONS AND NETWORKING

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. 3 credit(s).

17.487 ANALOG FILTER DESIGN

Presents a review of network analysis. This course also provides an introduction to synthesis, driving point impedance, approximation theory and transfer function realization. 3 credit(s). Prerequisite: 17.350.

17.490 ADVANCED MICROPROCESSORS

Studies the design of a 32-bit microprocessor system using the Intel 80386 and Motorola 68020, and the hardware requirements of interfacing the 32 bit data buses to memory devices. The interface to the various microprocessor peripherals such as the Intel 80387 and the MC68881 Coprocessors as well as the MC68851 Paged Memory Management Unit is investigated. System architecture including multitasking, virtual address translation, paging and protection schemes are also covered. 3 credit(s). Prerequisite: 17.483.

17.492 DIAGNOSTIC PROGRAMMING

An introduction to writing diagnostic hardware test programs, and the writing of programs for adapter cards and microprocessor peripherals. Included will be the writing of DOS device drivers and TSRs involving

the use of BIOS and DOS calls. Also included will be the creation of PROM firmware, memory testing algorithms, address and data line tests, system initialization code and power-on self tests. 3 credit(s). Prerequisite: 17.383 and either 92.265 or 90.267.

17.495 MICROPROCESSOR CONTROL

Provides an introduction to computer peripheral controllers that interface to mass storage devices and communication networks. The hardware requirements of interfacing to hard disk, tape, cassette and floppy are studied. Other topics considered are the various communication protocols and the interface to local communication networks such as Ethernet and StarLAN. Also considered are global communications using ASYNC, BISYNC, and SDL/HDLC. The necessary requirements to interface an 80188 microprocessor to each controller will be defined. 3 credit(s). Prerequisite: 17.348, and either 17.380, 17.383 or 17.384.

17.496 RADAR SYSTEMS

Offers an introduction to radar system analysis. An overview of basic radar operation is followed by a discussion of the factors influencing the radar operations of target detection and parameter estimation. Transmitters, antennas, receivers and system losses will be discussed. Propagation effects and clutter interference will be presented. Signal processing techniques will be described. Synthetic aperture radar and pulse compression techniques will also be discussed. Time permitting, various applications will be described. 3 credit(s). Prerequisite: 17.376.

19.401 OCCUPATIONAL HEALTH

Introduces students to chemical, physical, and ergonomic hazards in work environments, and the role that engineers and other professionals can play in protecting the health of the work force. Through a series of lectures and case studies, examples of the risks of work in modern manufacturing and service occupations are presented. Students work in small groups to apply basic principles of hazard identification and control. The social and economic complexities of the workplace are also explored as they influence the solution to technical problems. 3 credit(s).

23.101 ENGINEERING GRAPHICS

Presents material in both class and laboratory format. Topics covered include: geometric constructions; multiview sketching and projection; sectional views; isometric and oblique drawing; and dimensioning. 2 credit(s). 3 contact hours.

23.102 ENGINEERING DESIGN AND GRAPHICS

This course presents material in lecture/laboratory format. Topics covered include: dimensioning, print reading, auxiliary views, graphs, threads, gears, and the design process. A team design project with written and oral reports is required. 3 credit(s). Prerequisite: 23.101.

23.200 COMPUTER AIDED DRAFTING (CADRF)

Presents computer drafting concepts in a lecture/laboratory format. Using a personal computer-based software package (AUTOCAD), students will create engineering drawings based on standard orthographic projections. Multi-view, two-dimensional drawings will be presented. This is an introductory-level course. 3 credit(s). Prerequisite: 23.101, basic computer knowledge.

23.202 THERMO/FLUIDS LABORATORY

The objective of this course is to introduce the fundamentals of measurement and interpretation in the areas of thermofluids and fluid mechanics. Students will be directly responsible for collecting data on the supplied test apparatuses and interpreting the physical significance of the collected data, in relation to the laws and principals of thermo/fluids. The student will also be responsible for presenting the data and results of the analysis in the form of technical lab reports. 2 credit(s). 3 contact hours. Prerequisite: 23.241, 23.242, 42.226.

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 basci programming topics covered, teach the Virtual Instrument "VI" heirarchy, and to emphasize the importance of teamwork. 3 credit(s). Special Notes: Can be used as an MET elective or as a substitute for 90.211 (Introduction to Programming with C-Part I) in the MET Program.

23.221 STATICS

Basics of Mechanics is developed to establish the principles of statics. Forces and their effects on objects in equilibrium are discussed and analyzed. Concepts are used to determine forces on beams, truss analysis, and shear and moment diagrams. Structural supports and their corresponding reactions are studied to initiate beam analysis. Problems are used to demonstrate the basic principles. This course is a combined section with CET. 3 credit(s). Prerequisite: 92.125, 99.131.

23.222 DYNAMICS

This course introduces the student to the study of 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 part of the required curriculum for both Mechanical Engineering Technology (MET) students and Civil Engineering Technology (CET) students. This course is also necessary for any student wishing to pursue additional study in fluid dynamics, structural dynamcis, vibration analysis, and earthquake engineering. 3 credit(s). Prerequisite: 92.125, 92.126, 23.221/15.237.

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. 3 credit(s). Prerequisite: 23.221/15.237.

23.241 ELEMENTS OF THERMODYNAMICS I

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. 3 credit(s). Prerequisite: 92.126, 99.132.

23.242 APPLIED FLUID MECHANICS

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. Study of compressible flows, fluid couplings, and torque converters as well as flow measurement techniques will also be discussed. 3 credit(s). Prerequisite: 23.222.

23.243 ELEMENTS OF THERMODYNAMICS II

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. 3 credit(s). Prerequisite: 23.241.

23.262 ENGINEERING DATA ANALYSIS

Examines methods of statistical data analysis for manufacturing applications. Topics include: probability, hypothesis testing, curve fitting, correlation, sampling, and applications to quality assurance. 3 credit(s). Prerequisite: 92.126.

23.295 MATERIALS SCIENCE

Properties of materials, selection of materials and processing of materials for appropriate applications 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, and composites. 3 credit(s). Prerequisite: 99.131.

23.301 MANUFACTURING TECHNOLOGY LABORATORY

Presents fundamentals of manufacturing processes, with emphasis on machine shop operations. Problems in design, tooling and production aspects of manufacturing. Hands-on applications in a combined class and laboratory format. Assumes basic knowledge of mechanical drawing. 2 credit(s). 3 contact hours. Prerequisite: 23.101.

23.302 MECHANICS/MATERIALS LABORATORY

This course has been developed to strengthen basic theoretical topics in the area of mechanics of materials. Experiments performed to ASTM standards consist of coefficient of thermal expansion, flexure, tension, shear strength, biaxial flexure, and compression. Students work in groups. 2 credit(s). 3 contact hours. Prerequisite: 23.222, 23.223, 42.226.

23.305 MANUFACTURING PROCESSES

Presents an introduction to manufacturing, present status of manufacturing, testing of manufactured products, metal casting processes, sheet metal working processes, processing of polymers, joining processes, manufacturing systems, assembly, and manufacturing economics. 3 credit(s). Prerequisite: 23.301 or equivalent.

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 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. 3 credit(s).

23.320 MACHINE DESIGN

The course presents: materials strength and deformation, fracture toughness, stress intensity factor, thread standards and definitions, the mechanics of power screws, threaded fasteners, fatigue loading, bearing types, bearing life, bearing load, selection of bearings, Petroff's law, thin film lubrication, hydrodynamic theory of lubrication, gear conjugate action, contact and interference of gears. 3 credit(s). Prerequisite: 23.222, 23.223.

23.353 FORENSIC ENGINEERING

Scope of study includes design, remediation, and forensic investigative skills necessary to give insight into the behavior and analysis of structures and machine operations. Areas of analysis include cause of failure, evaluation of damage, and recommendations for repair from events such as collapse, construction defect, expansive soil, explosion, fire, snowstorm, wind, hail, tornadoes, vehicular impact and water leak. Forensic engineers including structural, mechanical and electrical engineering coordinate with architects, attorneys, contractors developers, owners, property managers and insurance companies to provide explanation for the origin and cause of damage to property and the recommended means to salvage and repair a loss.3 credit(s). CET/MET elective

23.354 PROBLEMS IN MECHANICAL ENGINEERING TECHNOLOGY

The course provides a review and extension of concepts of applied mechanics. It draws upon the student's knowledge of statics, dynamics, and machine design together with an introduction to various advanced topics such as elementary vibration theory to provide the student with an array of analysis techniques necessary to analyze and solve practical engineering problems. 3 credit(s). Prerequisite: 92.225, 23.320, 23.221, 23.222, 23.223.

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 that include transducers, signal conditioners, and data acquisition systems; 2) conduct experiments on relevant mechanical systems; 3) data verification using theoretical models. Effective written and verbal communication techniques are also emphasized throughout the course. 2 credit(s). 3 contact hours. Prerequisite: 23.222, 23.241, 23.242.

23.414 ENGINEERING ECONOMICS

Offers an analysis of available alternatives in equipment, plant and materials purchasing or leasing. Economic feasibility analysis of industrial projects including depreciation techniques, break-even analysis, benefit-cost techniques, replacement, present worth, and rate of return analysis will be covered. 3 credit(s).-

23.416 STATISTICAL QUALITY CONTROL

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. 3 credit(s). Prerequisite: 23.262 or equivalent.

23.419 COMPUTER AIDED MANUFACTURING

This course is an introduction to computer aided manufacturing with an overall perspective of the product design process with emphasis on how computers have affected the modern manufacturing environment. Topics include: overview of computer aided design systems, process engineering, basic tooling design, machining, programmable logic controllers (PLC), fundamentals of numerical control (NC), overview of industrial robotics, introduction to group technology (GT), process planning, and concurrent engineering. 3 credit(s). Prerequisite: 23.200, 23.301.

23.432 ENGINEERING OPERATIONS

Engineering Operations combines the engineering discipline with other disciplines, issues, and entities encountered in industry. Starting with a review of engineering practices, the course builds on theory and applies it to current events, cases, and design projects. Class participation is strongly encouraged and written papers are required. 3 credit(s). Prerequisite: Junior Standing.

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. 3 credit(s). Prerequisite: 23.262.

23.474 DESIGN FOR MANUFACTURE

Concepts of designing for manufacture (DFM) in new product development are studied. Methods of evaluating design efficiencies are discussed, and projects are assigned to evaluate current designs and methods for improving the design. Boothroyd and Hitachi methods of rating design for assembly are examined. 3 credit(s). Prerequisite: 23.305 or 23.306

23.475 HEAT TRANSFER

Covers basic transport mechanisms and particular laws; conduction heat transfer in a plane wall; conduction heat transfer in radial systems; general Fourier Law of conduction; differential formulation and solution techniques; radiation physical mechanism; solar radiation; characterizing factors associated with convection systems; boundary layer; laminar flow theory; turbulent flow theory. 3 credit(s). Prerequisite: 23.241, 23.242.

23.480 COMPUTER AIDED DESIGN (CADES)

This course is a continuation of 23.200 CADrf that covers advanced AUTOCAD topics including 3D and solids modeling techniques. A design project and written report are required. 3 credit(s). Prerequisite: 23.200.

23.484 INTRO PROE

Course will introduce the user to the principles of Pro/Engineer, solid modeling, and parametric design. It will mainly be 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. 3 credit(s). Prerequisite: 23.200.

23.485 INTRODUCTION TO SOLIDWORKS

This is a project-based course designed to introduce the student to mechanical design using SolidWorks. The three-dimensional program will be used to produce computer part models, assemblies and drawings. 3 credit(s). Prerequisite: CAD experience or 23.200.

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 an 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 chat-room discussion and five virtual laboratories. 3 credit(s). TNL

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. 3 credit(s).

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. 3 credit(s). Prerequisite: Coordinator or instructor permission.

27.203 PLASTICS MATERIAL SCIENCE III (THERMOSETTING RESINS)

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. 3 credit(s). Prerequisite: 27.202.

27.219 INTRODUCTION TO PLASTICS PROCESSING

The first part of the course will cover bulk properties, rheology, and miscellaneous properties which affect processing. Basic equipment such as drives, heater bands, various instrumentation, and barrels and screws will be thoroughly examined and discussed. The third core portion of the course will address basic extrusion. The remainder of the course will cover material designed to permit seamless transition to the injection molding course. Depending on the interests and backgrounds of course participants, the instructor will explore various forming processes, such as blown film, flat film, and profiles and pipes. Other processes and troubleshooting will be covered as time permits. 3 credit(s). Prerequisite: 27.201 or permission of instructor. Special Notes: Packaging Certificate enrollees only; NOT acceptable as credit course in the baccalaureate program.

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. 3 credit(s). Prerequisite: 27.201 or permission of instructor.

27.331 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. 3 credit(s). Prerequisite: Coordinator or instructor permission.

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. 3 credit(s). Prerequisite: 27.331.

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. 3 credit(s).

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. 3 credit(s).

27.342 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 (two-roll mill, single- and twin-screw extrusion) will be examined. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 27.371 or Coordinator or instructor permission.

27.375 INJECTION MOLDING SIMULATION USING MOLDFLOW(TM)

This course provides students with the necessary understanding and skills to utilize in practice Moldflow's(TM) injection molding simulation software during the design to manufacturing process of injection molded plastic parts. 3 credit(s).

27.376 PLASTICS MOLD ENGINEERING II

Serves as a continuation of 27.373. 3 credit(s). Prerequisite: 27.373.

27.381 EXTRUSION DYE DESIGN

Description to come. 3 credit(s).

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. 3 credit(s). Prerequisite: Permission of instructor.

27.404 PHYSICAL PROPERTIES OF POLYMERS II

Serves as a continuation of 27.403. 3 credit(s). Prerequisite: 27.403.

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. 3 credit(s). Prerequisite: Permission of instructor or coordinator.

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. 3 credit(s).

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. 3 credit(s). Prerequisite: Permission of instructor or coordinator.

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. 3 credit(s).

27.426 DYNAMIC MECHANICAL PROPERTIES OF PLASTICS II

Serves as a continuation of the 27.425 introductory course. 3 credit(s). Prerequisite: 27.425.

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. 3 credit(s). Prerequisite: Permission of instructor or coordinator.

27.451 SELECTED TOPICS I

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.452 SELECTED TOPICS II

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.453 SELECTED TOPICS III

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.454 SELECTED TOPICS IV

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.455 SELECTED TOPICS V

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.456 SELECTED TOPICS VI

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.457 SELECTED TOPICS VII

Addresses specialized topics in applied polymer sci-

ence, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.458 SELECTED TOPICS VIII
Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. 3 credit(s).

27.465 POLYMERIC MATERIAL SYSTEMS SELECTION
Please contact our Faculty and Student Support Center at (978) 934-2407 for an updated course description. 3 credit(s). Prerequisite: 27.201, 27.202.

30.160 INTRODUCTION TO EMERGENCY MEDICAL TECHNOLOGY
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. 6 credit(s). 6 contact hours.

30.208 NUTRITION AND CULTURE
Course examines the social and cultural uses of food. The origins of food preferences will be discussed along with the sociodemographic determinants, food faddisms, their benefits and harms. Components of the course also will explore vegetarianism and the nutritional consequences, the effects of food on mood and behavior, and the healing benefits of food. 3 credit(s).

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. 4 credit(s). Prerequisite: Anatomy & Physiology, Chemistry. SL

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. 3 credit(s). BS

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. 3 credit(s).

30.309 EXERCISE PHYSIOLOGY LABORATORY
This course should be taken concurrently with 30.305. It is designed to give students the opportunity to evaluate, test, and demonstrate some of the concepts discussed in 30.305. 1 credit(s). SL

30.315 KINESIOLOGY AND LAB
This course deals with the mechanics, evaluation, and analysis of human motion with emphasis on body mechanics and the deviations from sound mechanical principles. 4 credit(s). Prerequisite: Two semesters of each: Anatomy and Physiology, Physics. Summer Only.

31.201 COMMUNITY HEALTH AND ENVIRONMENT
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. 3 credit(s).

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 the methodology of various disciplines are examined. 3 credit(s).

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. 3 credit(s). Corequisite: 35.103. SL

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. 3 credit(s). Prerequisite: 35.101, 35.103 (or equivalent). Corequisite: 35.104.

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. 1 credit(s). 3 contact hours. Corequisite: 35.101. SL

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. 1 credit(s). 3 contact hours. Prerequisite: 35.101, 35.103. Corequisite: 35.102.

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 35.206.

35.208 NUTRITION AND CULTURE

This course will examine the social and cultural uses of food. The origins of food preferences will be discussed along with the sociodemographic determinants, food faddisms, their benefits and harms. Components of the course will also explore vegetarianism and the nutritional consequences, the effects of food on mood and behavior, and the healing benefits of food. 3 credit(s). Prerequisite: 35.206.

35.209 FOOD SANITATION, SAFETY, AND FOOD-BORNE DISEASES

This course is designed for persons who desire a basic knowledge of food sanitation and food-borne diseases. Microbiology of food-borne diseases will be described and discussed. Transmission, prevention, and treatment of food-borne diseases will be emphasized. In addition, a new generation of food-borne pathogens, such as Camphylobacter jejuni and Enterohemorrhagic Escherichia coli 0157:H7 and others will be discussed. 3 credit(s). Prerequisite: 35.206.

35.210 COMPLEMENTARY HEALTH ON THE WORLD WIDE WEB

This course will take a hands-on, learn-by-doing approach. Students will evaluate information related to a complementary therapy topic on the Internet and describe implications for health care professionals related to the integration of complementary and conventional health therapies. Students will develop an electronic journal related to the resources found that are deemed of value, while sifting out those sources that do not lend to the body of knowledge of the subject. Students will meet with faculty on a regular basis to share their progress. They will present their work at the end of the course in an oral or poster presentation. 3 credit(s). Prerequisite: 35.206.

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. 3 credit(s). Prerequisite: 35.102, 35.104. Corequisite: 35.213. SL

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. 1 credit(s). 3 contact hours. Prerequisite: 35.102, 35.104. Corequisite: 35.211. SL

35.307 CURRENT PERSPECTIVES IN NUTRITION

This course reviews cutting edge nutrition issues related to etiology, prevention, and treatment of chronic diseases and conditions. Topics include subject areas such as the role of nutrition in cardiovascular disease, cancer, hypertension, diabetes, obesity, eating disorders, osteoporosis and infections diseases. The role of nutrition in special populations, i.e., infants, teenagers, and the elderly will be discussed. Comparative traditional and/or complementary interventions for chronic diseases and conditions will be reviewed. 3 credit(s).

35.308 FOOD AND NUTRITION ENGINEERING

This course introduces students to the current technology of food processing and how it affects the nutritional composition of finished products. The design of functional foods will be discussed and how they can be created to meet a variety of nutritional needs; in particular, how functional foods can be designed to address the nutrition of disease states and special populations, i.e., infants, teenagers, and the elderly. 3 credit(s).

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, anti-anemic drugs, and antibiotics. Articles from current literature will be discussed. 3 credit(s). Prerequisite: 35.252. Offered in summer only.

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. 3 credit(s). Prerequisite: 35.252 or equivalent.

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. 3 credit(s). Prerequisite: 35.206.

36.372 OBESITY AND WEIGHT CONTROL

This course is designed to discuss the etiology, pathophysiology, and treatments of obesity, anorexia nervosa, and bulimia. Role of hereditary, neurological, metabolic, and environmental mechanisms are discussed. Particular emphasis on obesity. 3 credit(s). Prerequisite: 35.206.

36.406 BIOCHEMISTRY OF LIPIDS

This advanced course in the nutritional biochemistry and physiology of lipids will detail the role of lipids in the normal and pathological processes at both the cellular and whole organism level. Topics will range from general discussions of the digestion, absorption and transport of lipids to the role of eicosanoids and lipid soluble antioxidants during normal and diseased states, such as atherosclerosis, diabetes and hypertension. Subject matter will also include a discussion of the various interventions for the prevention and treatment of certain of these disease states. There will also be discussion of the current issues in lipid nutrition. 3 credit(s). Prerequisite: 36.350.

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. 3 credit(s). Prerequisite: One semester of General Microbiology.

36.463 NUTRITIONAL BIOCHEMISTRY

Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of vitamins and minerals as essential nutrients. The chemical and biochemical characteristics of vitamins and minerals are examined to account for the physiological functions. 3 credit(s). Prerequisite: 35.206, 36.350.

36.472 NUTRITION AND GENE EXPRESSION

Regulation of eukaryotic gene expression by specific nutrients, hormones, and metabolites will be discussed. Transcriptional, post-transcriptional, and translational mechanisms of specific nutrients with empha-

sis in disease development or prevention. 3 credit(s). Prerequisite: 35.206.

36.481 CLINICAL NUTRITION

This course is designed to discuss the principles of normal nutrition and physiology applied to clinical problems and the altered nutrient requirements in human disease. A study of disease topics of current clinical interest are also discussed. Students will also be asked to perform case studies of particular clinical diseases. 3 credit(s). Prerequisite: 36.371.

36.494 DIRECTED RESEARCH IN NUTRITION

Students with their faculty advisor structure a research project in the area of nutrition. A paper embodying the results of the project will be prepared. 3 credit(s). Prerequisite: Permission of instructor.

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. 3 credit(s). BS

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. 3 credit(s). BS

41.261 INTRODUCTION TO LEGAL CONCEPTS

Serves as an introductory legal course. It is a survey of many specific topics, such as product liability, consumer law, intellectual property, and ethics. More importantly, the course emphasizes critical legal thinking and human values. 3 credit(s). BS

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. 3 credit(s). BS, Collateral CJ

41.330 CHILDREN AND THE LAW

This course provides an overview of children's and adolescents' legal rights. 3 credit(s).

41.360 LEGAL ISSUES IN RACISM

A study of racial discrimination in the United States. Emphasis will be placed on relevant constitutional provisions, statutory provisions, and on United States Supreme Court cases. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s). Human Values.

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. 3 credit(s).

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. 3 credit(s).

41.368 EMPLOYMENT 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. 3 credit(s).

41.369 THE COURTS AND THE CONSTITUTION

Focuses on the separation of powers of the national government and the limitation of national power to preserve a degree of autonomy in the states. These dispersions of power, which have guaranteed fundamental individual liberties, are examined by reading leading U.S. Supreme Court cases. Students will explore how their freedoms to make moral choices are affected by the law of the constitution. 3 credit(s).

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. 3 credit(s).

41.371 LEGAL ISSUES IN HEALTH CARE

Examines the law of private and public health care. The rights and responsibilities of the health care professional to patient and society are investigated. Current health, political, economic, legal and societal issues affecting government, individuals, health care providers and insurance carriers are reviewed. 3 credit(s).

41.372 SPORTS AND ENTERTAINMENT LAW

Explores the legal issues that arise in the sports and entertainment industry. In the amateur sport setting, the legal relationships between athletes, coaches, schools, and athletic associations are examined in depth. Contract law, federal labor, and antitrust regulations are reviewed to define the rights and responsibilities of the various participants in the professional sports arena. 3 credit(s).

41.374 COMPUTERS AND THE LAW

Provides an introduction to the common areas of the law related to the acquisition and use of computer goods and services. Deals with computers and constitutionally protected private rights, computer crimes, computer torts, and contracts. Methods of protecting software development, such as copyright, patent, trade secrets, and program licensing are explained and discussed. Introduces legal research using a computer. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s).

41.383 ALTERNATIVE DISPUTE RESOLUTION

The traditional trial is becoming increasingly rare in modern civil litigation; the large majority of disputes are resolved by other techniques. This course will examine alternative methods of dispute resolution such as negotiation, mediation, arbitration, and the mini trial. 3 credit(s).

41.384 STATE AND LOCAL TAXATION

Studies the development of the state and local tax systems with particular emphasis on recent Massachusetts changes in real and personal property taxation as well as business taxes; consideration of the uniformity and equality requirements of both state and federal constitutions; and emphasis on the assess-

ment and collection of taxes and the taxpayer's legal remedies concerning tax abatements. 3 credit(s).

41.385 IMMIGRATION LAW

Studies the immigration, nationality, and naturalization laws of the United States. The topics discussed are: the immigrant selection system, the issuance of immigrant and nonimmigrant visas; grounds of excludability of aliens and waiver of excludability; grounds for deportation of aliens and relief from deportation; and change of status within the United States including legalization, refugee, and asylum status. 3 credit(s).

41.386 INTELLECTUAL PROPERTY

Surveys the law of the protection of ideas, trade secrets, inventions, artistic creations, and reputation. The course will briefly review the bases for patent, trademark, copyright and trade secret protection, the distinction between the various forms of intellectual property, and the statutory and common law methods of enforcing rights. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s).

41.391 FEDERAL TAXATION LAW

Discusses federal and state tax law for individuals, partnerships, and corporations. Also covers effective decisions on timing of income, expenses and capital investments and the structure of the Internal Revenue Code, regulations, and court decisions in the framework of the evolution of the federal and state tax law. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s).

41.395 BANKRUPTCY LAW

Studies federal and state statutes concerning credit lending, business bankruptcy, individual bankruptcy, protective trust devices, and credit report implications of bankruptcy. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s). Prerequisite: Minimum of 3 paralegal courses and Legal Studies Coordinator.

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. Seven expository essays are required. 3 credit(s).

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. 3 credit(s). Prerequisite: 42.101.

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 42.103. English composition requirement.

42.201 GREAT BOOKS OF ANTIQUITY

Studies representative literary selections from the

Hebrews, the Greeks, the Romans, and other societies of the ancient world. 3 credit(s). Prerequisite: 42.102. LT

42.202 GREAT BOOKS OF THE MODERN PERIOD

Studies representative literary selections from the period of the Enlightenment to the present. 3 credit(s). Prerequisite: 42.102. LT

42.205 HUMAN VALUES - WESTERN CULTURE

Addresses some of the important questions of human existence through a close study of representative literature from ancient times to the present. In the first semester students explore and evaluate three perennial themes: the problem of evil; self and society; freedom and fate. 3 credit(s). LTV

42.210 DRAMA

Presents a study of plays from the classical period to the present. 3 credit(s). Prerequisite: 42.102. LT

42.211 POETRY

Studies selections from the Renaissance through contemporary periods. 3 credit(s). Prerequisite: 42.102. LT

42.212 THE SHORT STORY

Studies the development of the short story from Poe and Chekhov to the present. 3 credit(s). Prerequisite: 42.102. LT

42.214 SATIRE

Focuses on selections from the classical through the contemporary periods, including satire in the media. 3 credit(s). Prerequisite: 42.102. LT

42.215 THE MODERN ESSAY

Provides a study of the essay as the literature of ideas, and presents a concentration of twentieth century writers with attention to early examples of the genre. 3 credit(s). Prerequisite: 42.102.

42.216 THE SHORT NOVEL

Discusses nineteenth and twentieth century short novels as a literary genre. 3 credit(s). Prerequisite: 42.102. LT

42.217 THE HORROR STORY

Explores the genre from Poe to the present. 3 credit(s). Prerequisite: 42.102. LT

42.218 COMEDY

Presents the theory and practice of comedy from the Greeks to the present. 3 credit(s). Prerequisite: 42.102. LT

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. 3 credit(s).

42.222 ORAL COMMUNICATION

Develops and applies the basic speaking skills that can be adapted to a variety of personal and professional contexts. Emphasis is placed on selection, analysis, organization and presentation of speech materials. Practice skills include listening, interviewing and the delivery and critique of extemporaneous speeches. 3 credit(s). Prerequisite: 42.102.

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. 3 credit(s). Prerequisite: 42.102. Note: Students may not receive credit for both 42.224 and 42.226

42.225 BASIC TECHNICAL WRITING

Introduces the basic techniques and formats used for communicating technical and scientific information in the workplace. Intended for engineering and science majors. Other majors must have instructor's permission. No College of Management majors. 3 credit(s). Prerequisite: 42.102.

42.226 TECHNICAL AND SCIENTIFIC COMMUNICATION

Studies the theory and practice of letters, memoranda, reports and oral presentations on specific scientific and technical problems. 3 credit(s). Prerequisite: 42.102. Students may not receive credit for both 42.224 and 42.226.

42.227 ESSAY WRITING FOR ENGLISH MAJORS

Analyzes and discusses the techniques and styles of selected professional essayists as well as the preparation of student essays. Emphasis will be placed on the writing process from prewriting through drafting and revising. English majors and minors only. 3 credit(s). Prerequisite: 42.102.

42.229 ESSAY WRITING FOR NON-ENGLISH MAJORS

Analyzes and discusses the techniques and styles of selected professional essayists as well as the preparation of student essays. Emphasis will be placed on the writing process from prewriting through drafting and revising. Non-English majors only. 3 credit(s). Prerequisite: 42.102.

42.230 FILM CLASSICS

Studies the elements of film as revealed in selected film classics with emphasis on critical analysis and evaluation. 3 credit(s). Prerequisite: 42.102.

42.232 TURNING FICTION INTO FILM

Studies literary works and their film adaptations. Emphasis is on analyzing what is at stake when the textual is adapted to a visual context. 3 credit(s). Prerequisite: 42.102. LT

42.236 SCIENCE FICTION

Designed to introduce students to understand science fiction and fantasy within the broader context of literature and literary theory. It attempts to develop and hone student's skills of critical analysis as it supplies them with the tools to contextualize their reading

experience - i.e., to understand the origins and politics of the books that they read. 3 credit(s). Prerequisite: 42.102.

42.237 WALDEN AND THE NEW ENGLAND EXPERIENCE
3 credit(s).

42.241 WOMEN IN FILM
Surveys the image of women in commercial film from its beginnings to the present, with emphasis on the films of the 1930's-40's and the 1970's-80's. Several commercial viewings will be scheduled. 3 credit(s). Prerequisite: 42.102. LT

42.242 THE HEROINE IN MODERN FICTION
Provides a study of selected short stories and novels which deal sympathetically with the changing roles of women. 3 credit(s). Prerequisite: 42.102. LT

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 per-sonal influences on these writers' work by studying trends and events in recent American history and themes reflected in the works. By studying contempo-rary 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 collab-oration, critical analysis, and by designing their own graphic organizers, students gain a breadth of knowl-edge 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 liter-ary texts. 3 credit(s). LT, AH

42.250 THE BIBLE AS LITERATURE
Presents a literary and historical analysis of selected Old and New Testament books. 3 credit(s). Prerequisite: 42.102. LT

42.260 STAGE DESIGN
Serves as an introduction to the technical expertise that goes into creating the world of a play. Learn the-atrical design of set, costumes, lighting, and sound. Projects are scaled to student's experience. 3 credit(s).

42.261 ACTING
Examines the theory and practice of acting including exercises in the elements and methods of acting and the preparation of a public performance. 3 credit(s).

42.262 ADVANCED ACTING
Designed for acting students who have experience in amateur productions or may be considering careers in the field. 3 credit(s). Prerequisite: 42.261 or equivalent or permission of instructor.

42.264 DIRECTING
Serves as an introduction to the process of directing a play. 3 credit(s).

42.267 INTRODUCTION TO SHAKESPEARE
Studies selected histories, comedies and tragedies. 3 credit(s). Prerequisite: 42.102. LT

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. 3 credit(s). Prerequisite: 42.102. LT

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. 3 credit(s). Prerequisite: 42.102.

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. 3 credit(s). Prerequisite: 42.102. LT

42.291 HISTORY OF ENGLISH LITERATURE I
A survey of representative writers and works from the Anglo-Saxon period to the mid-seventeenth century. 3 credit(s). Prerequisite: 42.102. LT

42.292 HISTORY OF ENGLISH LITERATURE II
A survey of representative writers and works from Milton into the romantic period. 3 credit(s). Prerequisite: 42.102. LT

42.294 HISTORY OF AMERICAN LITERATURE I
Studies the historical development of American litera-ture from the Colonial period to the Civil War. Selected works by representative authors from each period are studied. 3 credit(s). Prerequisite: 42.102. LT

42.295 HISTORY OF AMERICAN LITERATURE II
Studies the historical development of American litera-ture from the Civil War to World War I. 3 credit(s). Prerequisite: 42.102.

42.300 JOURNALISM
An introduction to techniques of writing for the news media. 3 credit(s). Prerequisite: 42.102.

42.301 NEWSWRITING
Introduction to techniques of radio and television newswriting, to fundamentals of public affairs report-ing, and to principles of newspaper editing. 3 credit(s). Prerequisite: 42.102.

42.302 CREATIVE WRITING: FICTION
Studies the theory and practice of fiction. Conducted as a workshop with close analysis of student work. 3

credit(s). Prerequisite: 42.102.

42.303 CREATIVE WRITING: POETRY

Discusses the theory and practice of poetry. Conducted as a workshop with close analysis of student work. 3 credit(s). Prerequisite: 42.102.

42.304 CREATIVE WRITING: SCREENWRITING

Studies the theory and practice of playwriting. Conducted as a workshop with close analysis of student work. 3 credit(s). Prerequisite: 42.102.

42.305 REVIEWING THE ARTS

Theory and practice of writing short, critical essays in a journalistic mode on the visual and performing arts. Special attention to theater, movie, and television criticism. Conducted as a workshop with close analysis of student work. 3 credit(s). Prerequisite: 42.102.

42.306 PROFESSIONAL WRITING

In an interactive, workshop-style setting, students will read and critique each other's work with an eye to the qualities professional editors look for in the work they buy and publish: story choice, voice, character development, use of dialogue, etc. The course will also examine the U.S. book and magazine markets, and provide guidelines on choosing a subject, writing a query letter, finding and selecting an agent, etc. 3 credit(s). Prerequisite: 42.102.

42.307 HISTORY AND DEVELOPMENT OF THE ENGLISH LANGUAGE

Examines the phonetic, lexical, syntactical, and semantic shifts in the English language from its beginnings to the present. 3 credit(s). Prerequisite: 42.102.

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. 3 credit(s). Prerequisite: 42.102.

42.317 BRITISH LITERATURE OF THE TWENTIETH CENTURY

Studies twentieth century British short stories, novels, poetry, and drama. 3 credit(s). Prerequisite: 42.102. LT

42.320 PERSONAL AND REFLECTIVE WRITING

Provides an emphasis on the writing process as students prepare autobiographical projects. Class time will focus on selected professional autobiographies and memoirs, as well as student writing. 3 credit(s). Prerequisite: 42.102.

42.330 TWENTIETH CENTURY BRITISH NOVEL

Presents a study of the novel from Conrad through Greene. 3 credit(s). Prerequisite: 42.102. LT

42.348 MODERN AMERICAN DRAMA

A study of such playwrights as O'Neill, Odets, Wilder, Williams, and Miller. 3 credit(s). Prerequisite: 42.102. LT.

42.356 LITERATURE OF THE VICTORIAN PERIOD

Discusses British fiction, poetry, and prose from 1830 to 1900. 3 credit(s). Prerequisite: 42.102. LT.

42.362 MODERN DRAMA

A study of selected Continental, British and American plays of the late nineteenth century to the present. 3 credit(s). Prerequisite: 42.102.

42.365 FICTION II

Allows students to present their work for encouraging and constructive criticism The focus is on the development of the writer's ability to see what needs revision. 3 credit(s). Prerequisite: 42.102. LT

42.366 POETRY II

Combines discussion and critique of student poems with readings in contemporary poetry and poetics. The focus is on enabling students to develop their individual voices, forms, and subjects. 3 credit(s). Prerequisite: 42.102, its equivalent or permission of instructor. LT

42.367 PLAYWRITING II

Advanced workshop in writing plays. Offered in conjunction with the Division of Continuing Studies Summer Program. 3 credit(s). Prerequisite: 42.102.

42.370 CONTEMPORARY AMERICAN FICTION

Discusses novels and short fiction from World War II to the present. 3 credit(s). Prerequisite: 42.102. LT

42.373 MODERN POETRY

A study of the development of British and American poetry from 1900 through World War II. 3 credit(s). Prerequisite: 42.102. LT

42.379 AGING, ILLNESS, AND DEATH

Serves as a comparative study of attitudes toward aging, illness, and death as portrayed in selected literary works examined in their historical and cultural contexts. 3 credit(s). Prerequisite: 42.102. LT

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. 3 credit(s). LT

42.381 THE EXISTENTIAL HERO

Studies the evolution of the existential hero in European and American literature and film. 3 credit(s). Prerequisite: 42.102. LT

42.402 SOFTWARE WRITING

Focuses on the document preparation process from start to finish, focusing on each stage in the process. Includes document design, document organization, using examples and illustrations, style, creating an index and the review process. 3 credit(s). Prerequisite: 42.408.

42.403 ADVANCED SOFTWARE WRITING

Introduces a range of advanced topics in software

writing. Topics may include electronic publishing, hypertext, 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. 3 credit(s). Prerequisite: 42.402.

42.404 SPECIAL TOPICS: FREELANCE WRITING

Includes strategies and skills necessary to write and publish as freelance journalist. Discussion and practice of query letters, marketing to editors, topic development and outlining on speculation, telephone and in-person interviewing, sale and resale rights, contracts, "stringing," developing a niche, et al. Guest speaker: editors and freelance writers. 3 credit(s). Prerequisite: 42.300.

42.408 PRINCIPLES OF TECHNICAL WRITING

Provides the fundamental concepts and principles of technical writing, including technical description, audience analysis, editing, document specifications and outlines, graphics, definitions, and revising documents. Writing assignments include preparing a document specification, editing, and creating graphics. 3 credit(s). Prerequisite: 42.102.

42.410 EDITING AND PUBLISHING TECHNIQUES

Presents students with the opportunity to study and apply basic editorial techniques within the context of present-day journalism and publishing practices. 3 credit(s). Prerequisite: Previous enrollment in an appropriate introductory level course, its equivalent, or permission of instructor.

42.411 DESKTOP PUBLISHING LABORATORY

Advanced word processing and computer-assisted proofing and page layout. Desktop technology related to printing, including font manipulation and graphic design. 1 credit(s).

43.105 WESTERN CIVILIZATION I

Traces the major forces in the development of European history from the beginning of Greek civilization to 1715. 3 credit(s). HS

43.106 THE MODERN WORLD

Examines the major forces in the development of modern European history from the French Revolution to the present. 3 credit(s). HS

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. 3 credit(s). HS

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. 3 credit(s).

43.111 UNITED STATES HISTORY TO 1877

Traces the development of American history and institutions from Colonization to the end of Reconstruction. 3 credit(s). HS

43.112 UNITED STATES HISTORY SINCE 1877

Examines significant developments in American history from the end of the Reconstruction period to the present. 3 credit(s). HS

43.202 SCIENCE AND THE MODERN WORLD

Examines the role of science in European and American society through the nineteenth and twentieth centuries. The course explores the development of new scientific theories in the life sciences and the physical sciences (including evolution, relativity, quantum mechanics, and genetics), addresses the institutionalization of science in Western society, and considers how science came to be applied to various social, cultural, and military concerns of the modern world. 3 credit(s). HS

43.206 AMERICAN ECONOMIC HISTORY

Studies the growth and development of the American economy from its European origins to the present. 3 credit(s). HS

43.210 HISTORY OF SPORTS IN THE U.S.

This course analyzes the development and significance of organized sports in America from the colonial era to the present. Topics include the relationship of sports to the evolution and economics of cities, and to community, regional and national identity. The course also will explore links between sports and race relations, struggles for workers' rights, and the modern women's movement. 3 credit(s). HS

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. 3 credit(s).

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. 3 credit(s).

43.242 WORLD WAR II

Presents a general survey of the war, together with a closer examination of selected topics. 3 credit(s). HS

43.270 WOMEN IN AMERICAN HISTORY

Studies women as a social group in American History. 3 credit(s). HS

43.272 THE AMERICAN INDIAN

Discusses the American Indian before the introduction of white European civilization. The course examines the history and culture of selected tribes of several regions within the present boundaries of the United States. 3 credit(s). HS

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. 3 credit(s). HS

43.281 SUB-SAHARAN AFRICA: COLONIES AND INDEPENDENT STATES

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.
 3 credit(s). HS

43.275 AFRICAN-AMERICAN HISTORY

Surveys African-American history from the Colonial era to the present that examines the development of black culture, protest traditions, family, and arts. The course also explores the nature of slavery and its impact on African Americans, emancipation and the development of segregated institutions, black migration to northern cities, the civil rights movement, and blacks in contemporary America. Course materials include narrative histories, autobiographies, and fiction. Students also view films and listen to black spirituals, Gospel music, jazz, and songs from the civil rights movement. 3 credit(s). HS

43.281 SUB-SAHARAN AFRICA: COLONIES AND INDEPENDENT STATES

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. 3 credit(s). HS

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.

3 credit(s). HS

43.311 HISTORY OF SCIENCE I

Explores the rise of the modern understanding of nature and the natural world as it developed in Western Europe, beginning with the establishment of universities and their elaboration of Aristotelian ideas and methods and the various institutional and cultural contexts in which they developed through the Renaissance, Scientific Revolution, and Enlightenment. 3 credit(s). HS

43.317 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. 3 credit(s). HS

43.321 THE HOLOCOST

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. 3 credit(s). HS

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. 3 credit(s). HS

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. HS 3 credit(s).Can be used for Gen Ed in History requirement (HS).

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. 3 credit(s). HS

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. 3 credit(s). HS

43.364 WAR AND COLD WAR: UNITED STATES HISTORY IN THE 1940'S AND 1950'S

Offers an in-depth examination of the economic, political, social, and cultural consequences of World War II and the development of the Cold War. 3 credit(s). HS

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. 3 credit(s). HS

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. 3 credit(s). Prerequisite: No freshman without permission.

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. 3 credit(s).

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. 3 credit(s). HS

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. 3 credit(s). HS

43.384 RADICALISM IN AMERICAN HISTORY

A biographical approach to the influence of radicalism on American history with emphasis on significant and representative personalities and heir contributions. 3 credit(s). HS

44.101 THE CRIMINAL JUSTICE SYSTEM

This course includes 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. 3 credit(s).

44.111 INTRODUCTION TO INDUSTRIAL SECURITY

An introduction to the planning, organization, and management of industrial, business, and government security resources. The focus is on the protection of assets via the integration of physical, personal, and information security. Relations between security organizations and government agencies are also explored. 3 credit(s).

44.115 INTRODUCTION TO HOMELAND SECURITY

Introduction to Homeland Security 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 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 level. 3 credit(s).

44.141 POLICE PROCESS

Examination of the historical development of police work with special emphasis on the conflicting role expectations facing the police officer. 3 credit(s).

44.201 COMPUTER APPLICATIONS IN CRIMINAL JUSTICE

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 this course, students will be able to utilize all three applications. This is a laboratory course. 3 credit(s).

44.212 WEAPONS OF MASS DESTRUCTION

An advanced course of study and examination of a variety of current issues and topics in criminal justice. 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. 3 credit(s).

44.221 CRIMINOLOGY

The definition and nature of crime, criminal statistics, and a survey of the theories of crime causation are

included. Emphasis is placed on crime patterns and typologies. Required of all CJ majors. 3 credit(s).

44.223 CRIME AND THE MEDIA

This course provides an overview about how the media portrays crime and its impact on the general public, crime, and victims and offenders. 3 credit(s).

44.233 CRIMINAL PROCEDURE

The workings of the legal system as they pertain to the criminal justice professional. Particular emphasis is placed on police, pretrial, and trial procedures. 3 credit(s).

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 crime, defense, and crimes against persons and property, defenses that pertain to criminal responsibility, capacity, crimes against persons and property, defenses to criminal charges and sentences. 3 credit(s).

44.235 CONSTITUTIONAL LAW

A course examining American constitutional doctrine as it has developed historically through the process of constitutional adjudication. 3 credit(s).

44.241 PHYSICAL SECURITY

Addresses the basic principles of physical security, with emphasis on tailoring these principles to the protection of specific operations and facilities. In addition, students will learn the significatnce of proper planning, design, modern techniques, and devices that enhance security while reducing costs. 3 credit(s).

44.243 CRIMINALISTICS I

This laboratory course will cover basic procedures in arrest, search and seizure, and the gathering and evaluation of evidence as to admissibility, weight, and competence. 3 credit(s).

44.244 CRIMINALISTICS II

This course is a continuation of Criminalistics I. 3 credit(s). Prerequisite: 44.243.

44.247 FEDERAL LAW ENFORCEMENT

This course is designed to provide students with an overview of the structures and functions of Federal Law Enforcement Agencies. The course will integrate field and professional experiences with case studies into an academic framework. 3 credit(s).

44.248 TERRORISM

This course 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. 3 credit(s).

44.249 ORGANIZED CRIME

This course is designed to familiarize the student with the "real" day-to-day operations of an Organized Crime syndicate. We will also explore other non-traditional groups and youth gangs. 3 credit(s).

44.251 INSTITUTIONAL CORRECTIONS

Detailed examination of the U.S. prison and jail systems, highlighting such issues as classification of offenders, counseling, treatment programs, prison violence, and privatization. 3 credit(s).

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 is covered. The course also covers legal, procedural, and substantive issues pertaining to the juvenile justice system. 3 credit(s).

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. 3 credit(s).

44.287 LEGAL WRITING FOR PARALEGALS

Reviews and strengthens good writing techniques necessary for all legal writing with an emphasis on organization, grammar, clarity, and legal style. Building on this foundation, the student will then prepare writing assignments, which include litigation documents, transactional documents, legal correspondence, and legal memoranda. Elements of informative and persuasive writing techniques are stressed. Each student receives individual attention to help develop skills and confidence and prepare outstanding writing samples for his or her portfolio. 3 credit(s). Prerequisite: 41.103.

44.301 COMPUTER APPLICATIONS FOR THE LEGAL PROFESSION

Introduces students to legal applications utilizing PC's. Emphasis is on hands-on instruction in a variety of legal software packages including word processing, spreadsheets, and database management. 3 credit(s). Prerequisite: 41.103.

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. 3 credit(s).

44.321 ADVANCED CRIMINOLOGY

An examination of theories of criminal behavior, both historical and contemporary, and their impact on the evolution of punishment, treatment, and rehabilitative practices. 3 credit(s). Prerequisite: 44.221.

44.322 CRIME PREVENTION

Explores the growth of crime prevention as an alternative to criminal justice responses to crime and examines current theories and research on different approaches to preventing crime, including develop-

mental, situational and community prevention. 3 credit(s).

44.326 DOMESTIC TERRORISM AND HATE CRIME
The issue of hate crime is examined, focusing on federal and state statutory laws and the dynamics of police, court, and corrections-based responses to the problem. 3 credit(s).

44.327 VIOLENCE IN AMERICA
To provide students with an in-depth analysis of the causes, context, and control of a wide range of violent crimes. 3 credit(s).

44.331 PENAL LAW
A study of the constitutional rights of individuals, including major policy issues and trends associated with revisions of penal codes. 3 credit(s).

44.335 JUVENILE JUSTICE
An examination of the civil procedures used in juvenile court as opposed to the adversarial procedures used in criminal courts, together with a history of the development of the juvenile courts and an examination of its constitutional basis. 3 credit(s).

44.341 INTERNATIONAL PERSPECTIVES ON CRIME AND CRIME CONTROL
An introduction to international perspectives on crime and crime control policy in Western countries. International developments and cross-national research on crime and victimization, criminal justice, and crime prevention policy, and current issues will be examined. 3 credit(s).

44.342 CRIMINAL PROFILING
This course provides an overview of the development and characteristics of the types of offenders who become criminal psychopaths. 3 credit(s).

44.343 FORENSIC PSYCHOLOGY
The application of psychological theories, principles, and research to issues of concern to the criminal justice system. 3 credit(s).

44.347 COMMUNITY POLICING
Community policing philosolphy, application issues, and contemporary research on community policing. An examination of community policing models. 3 credit(s).

44.351 COMMUNITY BASED CORRECTIONS
A comprehensive review of the use 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 centers. 3 credit(s).

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. 3 credit(s). Prerequisite: 44.234, 44.345, or 46.347.

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. 3 credit(s).

44.371 CRIMINAL JUSTICE PLANNING
A continuation of Criminal Justice Management with a particular emphasis placed upon student design and evaluation of programs and plans. 3 credit(s).

44.372 ISSUES IN CORRECTIONAL ADMINISTRATION
Specific analysis of the management of correctional institutions including custody, classification, reception, programming, release, staffing, scheduling, collective bargaining, community relations, and other related issues. 3 credit(s). Prerequisite: 44.370 or equivalent.

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. 3 credit(s). Prerequisite: 44.101.

44.380 SELECTED ISSUES 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 should not attempt this course. Subject matter to be announced in advance. 3 credit(s).

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. 3 credit(s).

44.383 LAW AND SOCIAL CONTROL
This course compares and contrasts the use of criminal and civil law mechanisms of social control. Substantive areas examined include mental illness, drug addition, and alcoholism. 3 credit(s).

44.385 CRIME AND MENTAL ILLNESS
A consideration of the realities and myths surrounding the relationship between mental illness and crime. Material from criminal justice and psychology will be examined. 3 credit(s).

44.390 INTRODUCTION TO CRIMINAL JUSTICE RESEARCH
An introduction to research methods for the criminal justice professional including terminology, standard methodologies, and elementary statistics. 3 credit(s).

44.393 FORENSIC COMPUTER CRIME
An examination of the causes and consequences of computer crime as well as the criminal justice system's response to the problem. 3 credit(s).

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. 3 credit(s). Prerequisite: 44.390.

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. 3 credit(s).

44.398 CRIMINAL JUSTICE 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. 3 credit(s). Prerequisite: 44.390.

44.401 SUBSTANCE ABUSE AND CRIME

Covers the problems posed by drugs and drug use/abuse and examines how the law is used to deal with those problems. 3 credit(s).

44.411 TECHNOLOGY AND CRIME PREVENTION

Examines issues and principles involved in crime preventions through the use of proven innovative design of various aspects of physical security. 3 credit(s).

44.412 ISSUES IN SECURITY ADMINISTRATION

This course is a continuation of 44.312 Security Management, and as such, will explore in greater depth those problems and issues in planning, budgeting, organizing, staffing, directing and controlling security operations. 3 credit(s).

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. 3 credit(s).

44.423 ELITE DEVIANCE AND CRIME

Examines the systematic violation of the laws and ethics of business and politics. The structure of power and privilege in relation to both political and economic deviance will be major topics. The impact of corporate crime and deviance on society and the societal and legal reactions will be explored. 3 credit(s). Prerequisite: 44.221.

44.425 CRIME AND PUBLIC POLICY

This course examines how law is created, the distinction between criminal and civil law, the use of law to promote public policy and the interrelationship between morality, law, and public policy. 3 credit(s)..

44.435 ALTERNATIVE DISPUTE RESOLUTION

Provides students with an in-depth understanding of complementary forms of dispute resolution, such as mediation, negotiation, and arbitration. Students will learn about the widespread applications of alternative dispute resolution from divorce mediation to labor arbitration to large environmental disputes. Training in negotiation, mediation, and interpersonal skills is stressed through role playing. 3 credit(s). Prerequisite: 44.101 or instructor permission.

44.477 INTIMATE PARTNER VIOLENCE

Examines the causes, consequences, and response to intimate partner violence and the latest research regarding criminal justice innovations and their effectiveness. 3 credit(s).

44.478 CHILD MALTREATMENT

Provides an overview of the criminal and non-criminal victimizations that occur to children and adolescents in the United States and elsewhere. Topics examined include the theories of and risk factors associated with child maltreatment, the physical and psychological consequences, and the response to child maltreatment by the criminal justice system and other agencies and organizations. 3 credit(s).

44.490 CRIMINAL JUSTICE HONORS SEMINAR

Specific practice in the definition, design, and execution of a research project, and an analysis of the impact of contemporary criminal justice research on policy development. 3 credit(s). Prerequisite: 44.390.

44.493 COMPUTER CRIME AND SECURITY

An examination of the causes and consequences of computer crime as well as the criminal justice system's response to the problem. 3 credit(s).

44.495 CRIMINAL JUSTICE FIELD STUDIES

Designed to provide students the opportunity to work for a semester (approximately 18 hours per week) with a criminal justice or related agency, or become involved in a research project. The purpose of this course is to broaden the educational experience to pre-service students in law-enforcement, probation, and correctional agencies within this area. It also is designed to provide a correlation between theoretical knowledge and practical experience in an area of particular interest to the student. Further, students choosing to take this course must take an additional criminal justice course above the 300 level in place of a free elective. By permission of instructor only. 6 credit(s). Prerequisite: Chair permission; Corequisite: 44.494.

44.496 PRACTICUM

Designed to provide students the opportunity to work for a semester (approximately 9 hours per week) with a criminal justice agency or related agency or become involved in a research project. The purpose of this course is to broaden the educational experience of pre-service students in law-enforcement, probation,

and correctional agencies within this area. It also is designed to provide a correlation between theoretical knowledge and practical experience in an area of particular interest to the student. 3 credit(s).

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? 3 credit(s). VC, AHE

45.202 INTRODUCTION TO LOGIC

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. 3 credit(s). VC

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. 3 credit(s). VC

45.205 ARGUMENTATION AND RHETORIC

This course will cover a range of popular means of persuasion, and provide tools for detecting and resisting them. Drawing on concrete examples from advertising, television, politics, and the like, the course will demonstrate how to distinguish legitimate from illegitimate persuasion. Central topics will include: the nature of language and meaning, the role of ambiguity and vagueness, and the use of logical argumentation both as a tool for uncovering illegitimate persuasion and as an effective means of persuasion in its own right. 3 credit(s).

45.207 CORPORATE COMMUNICATIONS

In this course students will learn how to communicate ideas clearly and effectively to a business audience. The course will cover: the basics of communication, business writing, how to make effective presentations, the optimal use of visual aides, the uses of web pages, global communication and cultural sensitivity, the ethics of communication, and the impact of the Internet on the communication environment. Special attention will be paid to the communicational demands posed by the rapid globalization of business and the rapid transformation of communication technologies. 3 credit(s).

45.311 AMERICAN CINEMA

An introductory course in film studies, this course brings Hollywood film making into clear focus as an art form, as an economic force, and as a system of representation and communication. From the early years of the twentieth century to the present day, audiences have learned about America by watching Hollywood movies. The course explores how Hollywood films work technically, artistically, and culturally to reinforce and challenge America's self-image. In certain ways, American Cinema is a language course, the language of motion picture. 3 credit(s).

45.314 PHILOSOPHY AND SCIENCE FICTION

A study of a variety of philosophical issues concerning knowledge, reality, the self, and society as exemplified in works of science fiction. 3 credit(s). VC, HV

45.356 THE HISTORY, THEORY, AND PRACTICE OF RHETORIC

The course will use interactive television between UMass Lowell (origin) and UMass Boston (destination). Students will learn not only what the great rhetors from Demosthenes, Cicero, and Quintilian to Lincoln, Churchill and M.L. King can teach us about effective oral presentation, but also how to apply what they learn by practicing with the leading edge broadcast communications technologies available in our classroom. Both written examination papers and short presentations will be required. 3 credit(s).

46.101 INTRODUCTION TO AMERICAN POLITICS

Provides an introductory analysis of structures, functions and behavior of the American political community. The analysis emphasizes politics and political behavior at the national level. 3 credit(s). BS

46.110 INTRODUCTION TO POLITICS

Serves as an introductory exploration of basic political concepts, ideologies, and themes. Stresses the importance of understanding politics for everyday life. 3 credit(s). BS

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. 3 credit(s). BS

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. 3 credit(s). BS

46.210 MEDIA AND 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. 3 credit(s). Prerequisite: BS.

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. 3 credit(s). Prerequisite: BS.

46.235 INTRODUCTION TO THE LAW AND POLITICS OF CONSTITUTIONAL GOVERNMENT

An introductory study of constitutional law and politics; analysis of constitutional doctrine and the American constitutional system, with emphasis on contemporary controversies. 3 credit(s). Prerequisite: BS, CJ collateral.

46.240 CONTEMPORARY POLITICAL THEORY

Examines major ideological currents in the contemporary world. Topics include communism, fascism, anarchism, socialism, nationalism, liberalism, and utilitarianism. 3 credit(s). BS

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. 3 credit(s).

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. 3 credit(s).

46.318 POLITICS AND 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. 3 credit(s).

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. 3 credit(s).

46.345 CONSTITUTIONAL LAW AND POLITICS

An advanced study of American constitutional doctrine as it has developed historically through the process of constitutional adjudication. 3 credit(s). BS, CJ Collateral

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. 3 credit(s).

46.350 URBAN POLITICS

A study of political power in, and the political structures of, urban areas and the major issues and conflicts currently confronting them. 3 credit(s).

46.353 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. 3 credit(s).

46.357 ENVIRONMENTAL POLICY

Addresses American environmental values and politics; attitudes and behavior towards the environment. Special attention to current issues. 3 credit(s). HS

46.360 AMERICAN FOREIGN POLICY

Course description coming soon. 3 credit(s). Can be used for History credit.

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. 3 credit(s).

46.412 KENNEDY POLITICS

This course examines the impact of the Kennedy family on the American political process, from Joseph P. Kennedy to Edward M. Kennedy. Through readings and films, students will evaluate the Kennedy legacy and the power of myth ideology in light of the Kennedys' contributions to the American political system. 3 credit(s).

46.417 ANALYZING 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. 3 credit(s).

47.101 GENERAL PSYCHOLOGY

Intended as an introductory course both for non-con-

centrators and for concentrators, 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. 3 credit(s). BS

47.209 SOCIAL PSYCHOLOGY

Presents an introduction to the study of social behavior in interpersonal relationships, groups, organizations, and the community. Topics include attitudes and attitude change, group dynamics, leadership, interpersonal influences, and nonverbal communication. 3 credit(s). Human Values, BSV

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. 3 credit(s). BS

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, corrections and social services. Students may participate 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. 3 credit(s). BS

47.260 CHILD AND ADOLESCENT DEVELOPMENT

Begins with an overview of major theoretical perspectives, research methods, and ethical issues in life-span human development. Based on a chronological approach, the course covers prenatal development and birth, infancy, childhood and adolescence, and the transition to adulthood. 3 credit(s). BS

47.269 RESEARCH 1: 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. (Typically offered only in day school.) 3 credit(s). Prerequisite: 47.101 or its equivalent.

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. 3 credit(s). Prerequisite: 47.101. BS

47.273 BRAIN, MIND AND BEHAVIOR

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. 3 credit(s).

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 will be compared. Current issues of importance in the study of learning also will be stressed. 3 credit(s). Prerequisite: 47.101. BS

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). 3 credit(s). Prerequisite: 47.101. BS

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. 3 credit(s). Prerequisite: 47.101.

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. The course is taught without a formal prerequisite, but students should have some previous course work in psychology. 3 credit(s).

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. The course is taught without a formal prerequisite, but students should have some previous course work in psychology. 3 credit(s). Human Values, BSV

47.351 HUMAN SEXUALITY

Addresses the biological, psychosocial, and attitudinal aspects of human sexuality through lectures, discussions, films from a variety of perspectives. 3 credit(s).

47.352 PSYCHOLOGICAL TESTING

Surveys major tests and techniques used to assess cognitive abilities, personality and vocational interests; an introduction to the various professional settings in which testing and assessment methods are used (e.g., mental health, rehabilitation, employment and personnel selection, criminal justice). Students learn to administer, score, and interpret specific tests and learn how to develop a case study or report based on test data and related information. 3 credit(s). Prerequisite: 47.101.

47.360 HUMAN DEVELOPMENT II

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. 3 credit(s). Prerequisite: 47.101 and 47.260 or comparable knowledge.

47.361 PROBLEMS AND ISSUES IN CHILDHOOD AND ADOLESCENCE

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). 3 credit(s). Prerequisite: 47.101, 47.260.

47.362 HUMAN DEVELOPMENT: THEORIES, ETHICS AND RESEARCH STRATEGIES

Examines some of the major theories, research methodologies, and ethical considerations in the study of human development. Utilizing a life span approach and building on the introductory course in life span developmental psychology, this course focuses upon an analysis of major theoretical perspectives and relevant research. 3 credit(s). Prerequisite: 47.260.

47.363 INTRODUCTION TO DEVELOPMENTAL DISABILITIES

Presents information about development and other disabilities with a focus on mental retardation. Looks at current practices in providing service to people with mental retardation and their families. 3 credit(s). Prerequisite: 47.101.

47.364 PSYCHOLOGY OF CRIME AND CORRECTIONS

Investigates the psychological aspects of crime and deviance and the nature of punishment and rehabilitation. Studies clinical case histories of criminal personalities in conjunction with contemporary psychological theory and research concerning antisocial and delinquent behavior. The nature of prisons, the criminal justice system, and aspects of psychological services are considered. 3 credit(s). Prerequisite: 47.101.

47.369 RESEARCH 2: STATISTICS

An intermediate level course, required of all psychology majors, focusing on computation 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. (Typically offered only in day school.) 3 credit(s). Prerequisite: 47.269 or permission of instructor.

47.375 RESEARCH 3: LABORATORY

An advance 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 learn to perform literature reviews; formulate a research question; operationalize variables; develop research designs; obtain ethical review and approval; and collect and analyze data. (Typically offered only in day school.) 4 credit(s). Prerequisite: 47.269, 47.369 and 47.276 or 47.277 or 47.278 or 47.273.

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. 3 credit(s). Prerequisite: 47.101 and 47.269.

47.473 SEMINAR IN SOCIAL PSYCHOLOGY

Presents an intensive study of one or more of the following special topics in social psychology: small group interaction; social aspects of health and illness; conformity; attitude formation and prejudice; patterns of communication, including nonverbal communication; psychology of sex roles; methods of social action and social change in the community. 3 credit(s). Prerequisite: 47.101 and permission of instructor.

47.474 SEMINAR IN DEVELOPMENTAL PSYCHOLOGY

Presents a careful consideration of selected topics in the area of human development, including the following: psychology of the family and parent-child relations; infant development; adjustment during adulthood; and death and dying, etc. 3 credit(s). Prerequisite: 47.269, 47.260.

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 (transactional analysis, Gestalt, 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. 3 credit(s). Prerequisite: 47.232 or 47.272 or related experience.

47.477 SEMINAR: CONTEMPORARY TRENDS IN PSYCHOLOGY

Surveys issues in contemporary areas of psychological practice and/or research; implications for future developments in the field will be covered. 3 credit(s). Prerequisite: 47.101. Other prerequisites may be specified by the instructor.

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. 3 credit(s). BS

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. 3 credit(s).

48.111 SOCIOLOGY THROUGH LITERATURE

This course employs selected literary texts to examine sociological times in 20th Century and Contemporary American society. 3 credit(s).

48.201 SOCIAL ANTHROPOLOGY

Examines several distinct cultures as a means of understanding both the universal constants and the variations in human societies, using the comparative approach to society. 3 credit(s). Prerequisite: 48.101. BS

48.212 CULTURES OF THE WORLD

Focuses on a different country or region each time it is given. Students examine the traditional culture, recent history, economic development, class structure, and international relations of the area covered. 3 credit(s). Prerequisite: 48.101. BS

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 48.101. BS

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? 3 credit(s). Prerequisite: 48.101. BS

48.234 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. 3 credit(s).

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. 3 credit(s). Prerequisite: 48.101. BS

48.255 SOCIOLOGY OF DEVIANCE

Presents an analysis of behavior considered deviant, such as drug abuse, crime and mental disorders. Attention is paid to cultural definitions of deviance and to social institutions that treat people defined as deviant. 3 credit(s). Prerequisite: 48.101. BS

48.256 POLITICAL SOCIOLOGY

Focuses on the development and use of power in modern society. Emphasis is placed on the relationship of American political institutions to economic institutions, to social class, and to supporting ideologies. 3 credit(s). Prerequisite: 48.101.

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. 3 credit(s). Prerequisite: 48.101. Human Values, BSV

48.285 FILM: FROM GANGSTER TO NOIR

This course examines the evolution of the Film Noir genre of Hollywood detective films from the 1930s through the 1950s, paying attention to national and international cultural and political trends as well as gender roles. Students will view, discuss, and write short papers on the films. 3 credit(s). Prerequisite: 48.101.

48.301 SOCIOLOGY OF HUMAN RIGHTS

Examines the politically divergent definitions of rights and freedoms. Attention will be paid to the activities of international human rights organizations to the human rights policies of the major powers. Various current human rights issues will be examined. Case histories may include the Soviet Union, Northern Ireland, South Africa, Afro-Americans, Armenians and Palestinians. 3 credit(s). Prerequisite: 48.101.

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. 3 credit(s). Prerequisite: 48.101.

48.308 EMERGING IMMIGRANT GROUPS IN THE MERRIMACK VALLEY

Course is designed to provide the student with a basic understanding of the demographic make-up of emerging new ethnic groups within various communities (municipalities) of the Merrimack Valley. The course is especially relevant to individuals who are working in a field that is undergoing rapid changes in the client/consumer make-up (e.g., teachers, social workers, law enforcement, or health professions). Emerging ethnic groups include: Latinos, Russians, Southeast Asians, and Haitians to mention only four. 3 credit(s). Prerequisite: 48.101.

48.309 MILITARY AND SOCIETY

Focuses on the role of war and the development of military technology in modern societies; how the armed forces interact with civilian economy and society. 3 credit(s). Prerequisite: 48.101.

48.317 SOCIOLOGY OF GENOCIDE

This course covers anti-Semitism and racism and how it led to Nazism and the final solution in Nazi Germany. It delves into the mind of Adolph Hitler and other perpetrators; the sociology of the Ghetto and the death camps. It will also compare Armenian, Cambodian, Gypsy, gay, and American Indian genocides, and will explore international intervention in Bosnia, Somalia, Haiti, and Rwanda today. 3 credit(s). Prerequisite: 48.101.

48.319 THE SOCIOLOGY OF THE SIXTIES

Course covers the following: The Socioliogy 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 re Clinton and Gore. 3 credit(s). Prerequisite: 48.101.

48.321 SOCIAL THEORY I

Course deals with Modern Social Theory, political, sociological, and economic thinkers from the mid-nineteenth century to the present. Begins with Marx, Durkheim, and Weber and continues on to modern and post-modern thinkers. 3 credit(s). Prerequisite: 48.101.

48.323 SOCIOLOGY OF IDEAS AND VALUES

Considers the ways in which ideas and values arise in society and, in turn, influence social action. Included are scientific facts, myths, ideologies, religions, morals, and common sense beliefs. 3 credit(s). Prerequisite: 48.101.

48.335 THE BLACK EXPERIENCE IN AMERICAN LIFE

Focuses on the careful examination of the role and status of Blacks in the United States since slavery. Prejudice, racism, and black separatism are emphasized. 3 credit(s). Prerequisite: 48.101.

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. 3 credit(s). Prerequisite: 48.101.

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. 3 credit(s). Prerequisite: 48.101.

48.348 UNDERSTANDING THE LATINO COMMUNITY

This course is intended to provide the student with an understanding of the Latino community. Special emphasis will be placed on the Latino community of the Merrimack Valley; however, much of the material can be generalized to Latinos in other areas. Attention will be placed on key institutions including the family, community religion, the natural support systems, migration and demographics, and gender. 3 credit(s). Prerequisite: 48.101. Students may not receive credit for both 48.348 and 59.348.

48.350 SOCIAL SERVICES

An examination of the structure of social welfare services in America. Attention is directed at the functions that welfare and mental health institutions serve in American society; the attitudes and values that surround these institutions; and the role of the social worker within them. 3 credit(s). Prerequisite: 48.101.

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. 3 credit(s). Prerequisite: 48.101.

48.357 THE SOCIOLOGY OF RELIGION

An investigation of religious institutions and experiences. Emphasis is placed on the influence of religion on social change. 3 credit(s). Prerequisite: 48.101.

48.361 SOCIOLOGY OF LAW AND THE CRIMINAL JUSTICE SYSTEM

Presents an introduction to the theory, structure, ideology, and practice of the criminal justice system. Particular attention is directed at the definition of crime and the impact of social, political, and economic policy on the operation of systems and their impact on its 'clients'. 3 credit(s). Prerequisite: 48.101.

48.370 WOMEN IN SOCIETY

The women's movement has changed our accepted views of women and men. The course seeks an understanding of the positions of women and men in culture, the economy, the family, and political life. Crucial are the questions: "What do we want?" and "What do we need?" Specific topics are examined. 3 credit(s). Prerequisite: 48.101.

48.382 SOCIAL MOVEMENTS

The primary goal of this course is to understand the world around us as it pertains to the occurence of social movements. The course is divided into basically two parts. In the first part we will examine the relation between Sociology and Social Movements (SM), forces underlying origin of SM and the approaches to the study of social movements in sociological literature. The second part which comprises the bulk of this course will be devoted to examination of some specific movements in the United States, their development and impacts these movements have had in changing the world we live in. Throughout this course we will attempt to see the linkages between social movements and the social-historical forces that underlie them. 3 credit(s). Prerequisite: 48.101.

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. 3 credit(s). Prerequisite: 90.111. BS

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. 3 credit(s). Prerequisite: P: 90.111. BS

49.211 STATISTICS 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. 3 credit(s). Prerequisite: 92.122 or equivalent.

49.325 U.S. 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. 3 credit(s).

50.101 BEGINNING FRENCH I

Provides instruction in the development of fundamental skills in oral expression, aural comprehension, reading, and writing. Tapes available for laboratory use. Students who have completed more than one year of French at the secondary level may not receive credit for this course. 3 credit(s).

50.102 BEGINNING FRENCH II

Serves as a continuation of 50.101, which is a prerequisite. 3 credit(s). Prerequisite: 50.101.

50.211 INTERMEDIATE CONVERSATIONAL FRENCH I

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 years of high school French, preferably during their junior and senior years, or for students who have completed 50.102, and for students who are unqualified for the 50.221, 50.222 sequence. 3 credit(s). Prerequisite: 50.102.

50.212 INTERMEDIATE CONVERSATIONAL FRENCH II

A continuation of 50.211, which is a prerequisite, with emphasis on continued development of comprehension and conversational skills. 3 credit(s). Prerequisite: 50.211.

50.221 READING AND CONVERSING IN FRENCH I

Emphasizes development of reading and conversational skills. Selected contemporary works provide the basis for developing conversational comprehension and composition skills. This course is intended for students with a solid foundation in the French language which has been gained from at least three years of high school study immediately prior to admission to the University. 3 credit(s).

50.222 READING AND CONVERSING IN FRENCH II

Offers a continuation of 50.221 with emphasis upon continued development of reading and conversational skills. 3 credit(s). Prerequisite: 50.221.

50.315 FRANCO-AMERICAN CULTURE

Aims to give the student an insight into the history and literature of New England's oldest and largest linguistic minority. He or she will be made aware of the extent and quality of the French language body of writings and its contributions to the Francophone world. Lowell's long journalistic, folkloric, and fictional works traditions will be explored from Atty. J.H. Guillet, editor of L'Echo du Canada (1872) down to beat generation poet-novelist Jack Kerouac and contemporary poet Paul Marion. 3 credit(s). Course to be taught mostly in French.

50.320 CONTEMPORARY FRENCH CULTURE AND CIVILIZATION

In this course we look closely at some fundamental issues reflecting the rapidly changing paramters 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 funcation within the recently defined Europe unit and the new global world order; the current status of women; the relashionship between cities and ghettos, violence and crime; the nature of emerging forms of cultural production within new trends and styles of modernite. 3 credit(s). Prerequisite: 50.212. Conducted in French.

50.340 CONTEMPORARY FRENCH CINEMA

Provides a critical appreciation of contemporary French cinema (1985-1995) aiming at sorting out its eclecti-

cism and focusing on the following aspects: 1) The war film and national identity; 2) Representations of sexuality and women filmmakers; 3) The polar and the cinema du look; 4) Filming the arts and the heritage genre. 3 credit(s). VCA

50.374 CLASSICS OF FRENCH CINEMA

Provides a survey of characteristic styles in French cinema since 1930. The poetic imagination of Cocteau and Carne, the classicism of Renoir, the ironic romanticism of Truffault, and the revolutionary spirit of Godard presented in their cultural and esthetic context. Films shown with English subtitles. Discussions and readings in English. 3 credit(s).

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. Conducted in English. 3 credit(s). AHD

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. 3 credit(s). VCA, AHD

50.380 YOUNG AND RESTLESS IN FRENCH CINEMA

The course will focus on two types of films, a) works such as "Forbidden Games" (Rene Clement, 1952), "Small Change" (Francois Truffaut, 1976), "Sugar Cane Ally" (Euzhan Palcy, 1984), "Good Bye, Children" (Louis Malle, 1987), "Cross my Heart" (Jacques Fansten, 1990), "My Father's Glory" (Yves Robert, 1990), "Ponette" (Jacques Doillon, 1996), for which relevant pedagogical material will be elaborated by interested class participants for school use, and b) a variety of post 1980's productions concerning "les problemes de la jeunesse", - a leitmotif of politicians and social commentators. This body of work will include films such as "A nos Amours" (Maurice Pialat, 1983), "Le Grand Chemin" (Jean-Loup Hubert, 1987), "Life is a Long Quiet River" (Etienne Chatiliez, 1988), "The Little Thief" (Claude Miller, 1988), "Love Without Pity" (Eric Rochant, 1991), "Oliver, Oliver" (Agnieszka Holland, 1993), "Hate" (Mathieu Kassovitz, 1995), "A Single Girl" (Benoöt Jacquot, 1995), "La Promesse" (Jean Pierre and Luc Dardenne, 1996), "Bye-Bye" (Karim Dridi, 1995). All films are in French with English subtitles. Each screening will be preceded by an introduction, placing the film in its historical context. Discussion and readings in English, which does not exclude questions and answers in French from interested participants and your instructor. 3 credit(s).

50.394 ENHANCING AND ADVANCING YOUR KNOWLEDGE OF FRENCH

Designed primarily for teachers of French, but open to others who need to enhance and advance their linguistic skills. Conducted entirely in French, the course will

focus on the vocabulary of modern French, selected grammatical and syntactical structures, and actual French courses culled from the Web. 3 credit(s).

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. 3 credit(s). VCA

52.335 CINEMA AND ITALIAN AMERICANS

A course looking at the ways in which film addresses issues of ethnicity and its representation in the multiethnic 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. 3 credit(s). VCA

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. 3 credit(s). VC

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. 3 credit(s). VCA

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. 3 credit(s). VCA

54.101 BEGINNING SPANISH I

Provides instruction in the development of fundamental skills in oral expression, aural comprehension, reading and writing. Tapes available for laboratory use. Students who have completed more than one year of Spanish at the secondary level may not receive credit for this course. 3 credit(s).

54.102 BEGINNING SPANISH II

Serves as a continuation of 54.101. 3 credit(s). Prerequisite: 54.101 or equivalent.

54.211 INTERMEDIATE CONVERSATIONAL SPANISH I

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 or for students who are unqualified for the 54.221, 54.222 sequence. 3 credit(s). Prerequisite: 54.102 or equivalent.

54.212 INTERMEDIATE CONVERSATIONAL SPANISH II

A continuation of 54.211, which is a prerequisite, with emphasis upon continued development of comprehension and conversational skills. 3 credit(s). Prerequisite: 54.211 or equivalent.

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. 3 credit(s). Prerequisite: 54.102 or equivalent.

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. 3 credit(s). Prerequisite: 54.221 or equivalent.

54.245 ADVANCED SPANISH CONVERSATION

Presents advanced oral fluency in rapid and idiomatic speech. Topics of contemporary significance will be selected from contemporary prose. 3 credit(s).

54.254 TOPICS IN CONVERSATIONAL SPANISH

Discusses a wide spectrum of contemporary topics with the object of continuing to develop facility and accuracy of expression. 3 credit(s). Prerequisite: Advanced level proficiency.

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. 3 credit(s). Prerequisite: Permission of instructor.

54.302 INTRODUCTION TO LATIN AMERICAN LITERATURE

Studies the major writers of Latin America from the indigenous literature to the modernist period. The authors and their works will be placed in their historical, sociological, and literary perspective, thus introducing students to the Latin American world. Conducted in Spanish. 3 credit(s). Prerequisite: Permission of instructor.

54.310 SPANISH CIVILIZATION AND CULTURE

Considers Spanish culture and civilization up to the present. Through audiovisual aids, current newspapers and selected readings, the student will explore the Spanish way of being, thinking, and living. Emphasis is placed on the main contributions of Spain to the Western world. 3 credit(s).

54.313 FIELDWORK IN THE SPANISH COMMUNITY

Involves individual assignments under the sponsorship of local service agencies servicing the Spanish-speaking community involving individual family and group contact. Written and oral reports will be in Spanish. 3 credit(s). Corequisite: 54.212 or equivalent.

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. 3 credit(s).

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. 3 credit(s). Prerequisite: Permission of instructor.

54.333 ADVANCED SPANISH GRAMMAR AND SYNTAX I

A systemic study of complex grammatical and syntactical structures in Spanish with extensive practice in writing. Required for Spanish majors. 3 credit(s).

54.334 ADVANCED SPANISH GRAMMAR AND SYNTAX II

A continuation of 54.333. Required for Spanish majors. 3 credit(s).

54.335 SPANISH WOMEN AUTHORS IN TRANSLATION

From a seventeenth century nun, to a turn-of-the-century Countess, to women reaching artistic maturity under the Franco dictatorship, to the search for identity and meditations on universal themes by contemporary artists, this course will study major feminine voices in Spanish literature. At the same time, it will explore themes and concerns common to countless women writers regardless of nationality. 3 credit(s). AE

54.347 ADVANCED SPANISH CONVERSATION AND COMPOSITION

The course aims at developing advanced oral proficiency in rapid idiomatic speech. Topics of contemporary significance are selected for discussions. Frequent compositions are designed to strengthen students' self-expression and facility in prose writing. Required for Spanish majors. 3 credit(s).

54.401 SELECTED AUTHORS

An intensive study of the works by a few Spanish and/or Latin American authors. 3 credit(s).

54.403 THE GOLDEN AGE

A study of the development and character of XVIIth century Spanish drama, novel and poetry with special emphasis on Cervantes, Lope de Vega, Calderon and Quevedo. An analytical study of some of the master-

pieces from structural and stylistic points of view, taking into consideration their relation to the period and the expression of universal values. 3 credit(s). Prerequisite: 54.350 or permission of instructor.

54.409 TWENTIETH CENTURY SPANISH LITERATURE

Studies the famous generation of 1927 and the major literary trends during and after the Spanish Civil War. 3 credit(s). Prerequisite: 54.350 or permission of instructor.

54.410 REALISM AND THE NINETEENTH CENTURY SPANISH NOVEL

Offers a study of fundamental aspects of life, thought, land itself and its sense of history as reflected in the literary masterpieces of Valera, Galdos, Alarcon, Pereda, and others. An analysis of the literary techniques and fiction of the Realism will be included. 3 credit(s). Prerequisite: 54.315 or permission of instructor.

54.411 HISPANIC SHORT FICTION

This course is for students who have completed the first four semesters of Spanish and who have a good reading and writing knowledge of the language. The course is an ideal introduction to the analysis of literary texts in Spanish. Students will become familiarized with basic terminology for the analysis of narrative, and will practice analysis as they read four short novels from different Spanish-speaking countries. In so doing, they will not only develop and enhance their reading enjoyment in Spanish, they will also learn more about diverse socio-historical contexts in the Hispanic world. 3 credit(s). Prerequisite: Taught in Spanish.

54.412 SHORT STORY IN LATIN AMERICA

Provides an analytical examination of the thematic and linguistic structures in major Latin American short story writers such as Borges, Cortazar, Marquez, Rulfo. 3 credit(s). Prerequisite: 54.350 or permission of instructor.

57.475 COMMUNITY CONFLICT RESOLUTION

This course gives students an understanding of the main issues and solutions involved in 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. 3 credit(s).

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. 3 credit(s). AE, CD, HSA

58.105 COMPARATIVE ARTS

This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as 'art and morality' followed in the Renaissance as "art and sciences" continued in the Enlightenment as "art and society" contrasted in the nineteenth century as "art and entertainment." 3 credit(s). AE, HSA

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. 3 credit(s). CD, HSA/AHD

58.204 HISTORY OF ART II: RENAISSANCE TO MODERN ART

A survey of the 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 and Post-Impressionism-and the Twentieth Century Movements - Expressionism, 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. 3 credit(s). CD, HSA/AHD

58.205 STUDIES IN WORLD ART

Historical and critical examinations 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. 3 credit(s). AE, HSA

Mexican Muralists
Examination of the dominance of Mexican Muralists in the visual and aesthetic culture in Latin America in the early twentieth century. Discussion of the implication of the social revolution and political sentiments on Mexican murals respresenations. Also stylistic and iconographical analysis of the Muralists, such as Diego Rivera, Jose Clemente Orozco, David Alfaro Siqueiros, Rufino Tamayo as well as Frida Kahlo will be studied in relation to past muralist traditions.

Primitive Art: Method and Theory
The purpose of this course is to provide a general overview of the art of the traditional cultures of Africa, North America and the South Pacific. This overview will be presented within a critical framework that questions the relationship between "civilized" viewers and so-called "primitive" art.

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.

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. 3 credit(s). AE, HSA

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. 3 credit(s). AE, HSA

58.231 GREEK AND 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. 3 credit(s). AE, HSA

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. 3 credit(s).

58.300 ART HISTORY, MUSIC AND CULTURE

This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as "art and morality" followed in the Renaissance as "art and sciences" continued in the Enlightenment as "art and society" contrasted in the nineteenth century as "art and entertainment." Furthermore, this course surveys some of the fundamental aspects of music and art, 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. In addition, with a comparative analysis between the modes of visual and aural representation, visual and aural perception, this course analyzes the principal forms and genres of the visual and aural elements of art history and music history, providing an understanding for human creativity and expression. 3 credit(s). AE, HSA

58.305 THEATER IN THE ARTS

Students will explore the ways in which theater and the visual arts enhance and stimulate language acquisition and critical literacy development as well as promote the development of a sense of historical awareness and cultural identity. 3 credit(s). AE, HSA

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. 3 credit(s). Prerequisites: 58.101 and/or 58.211 or permission of instructor. AE, HSA.

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. 3 credit(s). AE, HSA

58.330 ITALIAN MANNERISM ART

A study of painting, sculpture, and architecture in Florence, Rome, and Venice during the sixteenth-century. Special emphasis on the formation of the High Renaissance, Mannerism, and Maniera and the role of representative artists of the period: Leonardo da Vinci, Michelangelo, Raphael, in Central Italy; Giorgione, Titian in Venice; as well as the Mannerist artists: Pontormo, Rosso, Parmigianino,Bronzino, Salviati, and Vasari in painting; Bandinelli, Giambologna, and Cellini in sculpture; Peruzzi, Vignola, and della Porta in architecture; and, women painters, such as Sofonisba Anguissola, Lavinia Fontana and Barbara Longhi will be studied. 3 credit(s). AE, HSA

58.332 BAROQUE ART IN ITALY

The development of painting, sculpture and architecture in Italy during the seventeenth century with special emphasis on Rome and Venice. The role of representative artists (Caravaggio, Bernini, Borromini, Pietro da Cortona, Artemisia Gentileschi, Elisabetta Sirani and Longhena) is emphasized. 3 credit(s). Prerequisite: 58.101 and/or 58.204, 58.321 or permission of instructor. AE, HSA.

58.334 NORTHERN BAROQUE ART

The examination of seventeenth-century painting outside Italy with emphasis on Dutch, Flemish, Spanish, and French Art. The role of representative artists of the period (Rembrandt, Rubens, Vermeer, Velazquez, Judy Leyster, Clara Peeters, and Poussin) is emphasized. 3 credit(s). Prerequisite: 58.101 and/or 58.204, 58.323 or permission of instructor. AE, HSA.

58.340 WOMAN 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. 3 credit(s). Prerequisite: 58.101 and/or 58.203, 58.204 or permission of instructor. AE

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. 3 credit(s). AE, HSA.

58.352 CRITICAL ISSUES: HISTORY OF ART, THEORY AND CRITICISM

Examination of issues of content, theory, and criticism in traditional, modern and contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. 3 credit(s). Prerequisites: 58.203, 58.204 and 58.350 or permission of instructor. AE, HSA.

58.360 MUSEUM ISSUES

The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museum's history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of one's choice. 3 credit(s). Prerequisites: 58.203 and 58.204. AE, HSA.

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. 3 credit(s). Prerequisites: 58.203 and 58.204 or permission of instructor. AE, CD, HS.

58.490 ART HISTORY SEMINAR

Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated. 3 credit(s). Prerequisite: Permission of art history instructor. AE, HSA.

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. 3 credit(s). Prerequisite: Permission of art history instructor. AE, HSA.

58.495 ADVANCED TUTORIAL IN ART HISTORY

A program of directed study affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate and investigate an additional problem. The purpose is to sharpen and refine skills for scholarly research and presentation. 3 credit(s). Prerequisite: Demonstrated proficiency in an area selected for directed studies and permission of art history instructor. AE, HSA.

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." 3 credit(s). Prerequisite: Permission of art history coordinator or supervising art history instructor. AE, HSA.

59.203 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. 3 credit(s). AE, CD, and HSA/AHD

59.204 HISTORY OF ART II: RENAISSANCE TO MODERN ART

A survey of the 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 and Post-Impressionism-and the Twentieth Century Movements - Expressionism, 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. 3 credit(s). AE, CD, HSA/AHD

59.205 HUMAN VALUES IN WESTERN CULTURE I

Addresses some of the important questions of human existence through a close study of representative literary, philosophical, and religious texts from ancient times to the present, as well as relevant modern works in the behavioral and political sciences. In the first semester, the students explore and evaluate three perennial themes: the problem of evil, self and society, and freedom and fate. 3 credit(s).

59.206 HUMAN VALUES IN WESTERN CULTURE II

Serves as a continuation of 59.205. In the second semester, the thematic units are the pursuit of knowledge, the nature of humankind, and the experience of love. May be taken independently of 59.205. 3 credit(s).

59.208 WESTERN CULTURAL HERITAGE I

Explores how the actual development of a culture proceeds on many levels at once; the art, literature, philosophy, and social structure of a given historical period evolve together, interact with one another, and eventually give rise to a new era. These courses are designed to capture the richness of the various periods of western civilization, to discern networks of

dependency and influence among the diverse aspects of epoch's culture, and to trace lines of continuity between one age and another. The first semester will treat the period from ancient civilization to the Protestant reformation; the second semester will focus on developments from the seventeenth through the twentieth centuries. 3 credit(s). HSV

59.209 WESTERN CULTURAL HERITAGE II

Serves as a continuation of 59.208. May be taken independently of 59.208. 3 credit(s). HSV

59.217 MEDIA AND CULTURE IN 20TH CENTURY AMERICA

We will examine the Media (i.e., the Fourth Estate) in America and how the Media shape, and are shaped by, American cultural attitudes and perceptions. The course will do this through an exploration of three con-joined strands in American culture and thought - religious enthusiasm, free market capitalism, and Manifest Destiny/imperialism - and how these are at once responsible for and reinforced by the Media in America. 3 credit(s). HSV

59.240 INTRODUCTION TO WOMEN'S STUDIES

This course is an Interdisciplinary introduction to the field of Women's Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented, such as past and present stratification in work and family, sexual identities, medical representations of women, and violence against women. Social movements for women's equality and feminist theories and methods are also introduced. 3 credit(s).

59.315 ISLAM CULTURE AND MEDIEVAL EUROPE

Helps the student to understand the major tenets of Islamic culture and to analyze its growth and dissemination in the Mediterranean basin. Examines the relationship of Islamic culture to medieval Europe via Moorish civilizations of Spain and, to a lesser extent, of Sicily. 3 credit(s).

59.326 MULTIMEDIA FOR CULTURAL STUDIES

In order to effectively explore the use of multimedia, students will engage in the entire process of designing and publishing a website from concept and design to finished product. Tasks in the process will include website evaluation, using tables, and adding design and multi-media elements. While the focus of the course is on website design, other topics including video streaming and animation as well as site copyright issues and the compliance of student sites to existing standards and guidelines will be addressed. In order to design and publish your own original website, you will learn Microsoft FrontPage 2002, a leading html editor, and PhotoShop Elements, a digital imaging software package. Prerequisites: Competent PC and Web Browser operations. 3 credit(s).

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 20th Century and investigates the music that women composed. Students learn basic concepts about music, allowing them to come to their own con-clusions about the musical work. Interviews with women who compose or perform test the material presented in the course readings. 3 credit(s).

59.348 UNDERSTANDING THE LATINO COMMUNITY

This course is intended to provide the student with an understanding of the Latino community. Special emphasis will be placed on the Latino community of the Merrimack Valley; however, much of the material can be generalized to Latinos in other areas. Attention will be placed on key institutions including the family, community religion, the natural support systems, migration and demographics, and gender. 3 credit(s).

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 under-score various themes, such as how women have been represented in these films. Conducted in English. 3 credit(s). VCA, AHD

59.374 EUROPEAN 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: Sverák (Czechoslovakia), the Dardenne brothers (Belgium), Fassbinder and M. von Trotta (Germany), Kassovitz and Klapisch (France), MacKinnon and O'Donnell (Ireland), Manchevski (Macedonia), Bodrov (Russia), Gutiérrez-Aragón (Spain), Dizdar, Frears, and Prasad (UK). No knowledge of other languages other than English is required. Conducted in English. All films have English subtitles. 3 credit(s). AHD

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 60.201.

60.301 INTERMEDIATE ACCOUNTING I

Examines generally accepted accounting theory and practices 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 pro-nouncements of the Financial Accounting Standards Board are emphasized. 3 credit(s). Prerequisite: 60.202, BSBA students (non-Accounting majors) and COM Dean Permission.

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 accountant's 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 cost management systems, which examine a proactive role in planning, managing, and reducing costs. 3 credit(s). Prerequisite: 60.202, BSBA students (non-Accounting majors) and COM Dean Permission.

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. 3 credit(s). Prerequisite: 60.201, BSBA students and COM Dean Permission.

61.301 BUSINESS FINANCE

Principles of financial management, including working and fixed capital, sources of funds, financial statements, financial planning and capital structure. 3 credit(s). Prerequisite: 49.201, 49.202, 60.201, COM filter courses, BSBA or Business Minor students and COM Dean Permission.

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. 3 credit(s). Prerequisite: 61.301, BSBA students and COM Dean Permission.

61.421 PORTFOLIO AND SECURITY ANALYSIS

Advanced course on investment theory and applications. Topics covered include stock market behavior, portfolio and capital market theories, and securities analysis. 3 credit(s). Prerequisite: 61.300 and COM Dean permission.

61.431 CAPITAL PLANNING

Advanced study of the principles of financial analysis. Covers topics such as acquisition of long-term assets, capital budgeting models, and the analysis of mutually exclusive projects. 3 credit(s). Prerequisite: 61.303, BSBA students and COM Dean Permission.

61.479 CURRENT TOPICS IN FINANCE

Topics of current interest in Finance. Subject matter to be announced in advance. 3 credit(s). Prerequisite: 61.301 and COM Dean permission.

61.491 INTERNATIONAL FINANCE

Financial aspects of international business operations. Evaluation of risks associated with multinational operation and managerial decision making under conditions of financial uncertainty. 3 credit(s). Prerequisite: 61.301 and COM Dean permission.

61.499 INDEPENDENT STUDY IN FINANCE

An opportunity for students to carry out individualized study relating to the field of finance under the supervision of a member of the faculty. 3 credit(s). Prerequisite: 61.301, permission of instructor, and COM Dean permission.

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. 3 credit(s). Prerequisite: 47.101, 48.101, 49.201.

62.302 MARKETING RESEARCH

Analysis of the information gathering function of marketing management. Design, execution and evaluation of marketing research. 3 credit(s). Prerequisite: 62.201, 49.212, and COM Dean permission.

62.303 INTERNATIONAL MARKETING

The marketing aspect of international business. Cultural dynamics, economics, political and legal constraints as they affect international marketing institutions and practices. 3 credit(s). Prerequisite: 62.201 and COM Dean permission.

62.311 MARKETING OPPORTUNITY ANALYSIS

Focuses on the strategic role of marketing and the functions, which leads the business to new products and new markets. Emphasis on market development and product development. 3 credit(s). Prerequisite: 62.201 and COM Dean permission.

62.312 MARKETING TACTICS

Focuses on tactical process of managing the marketing mix. Emphasis on market penetration. Term project: marketing plan. Career relevance: understand the role of the marketing communications specialist; appreciate sales and service support activities. 3 credit(s). Prerequisite: 62.201, BSBA students, and College of Management Dean permission.

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 excercise, marketing audit. Career relevance: develop understanding of professional selling, retail and wholesale operations, purchasing, and logistics. 3 credit(s). Prerequisite: 62.201 and COM Dean permission.

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. 3 credit(s). Prerequisite: 62.201, BSBA students and COM Dean Permission.

62.402 BUYER BEHAVIOR

Applications of behavioral theories and techniques to

the understanding of consumer and organizational pur-
chasing processes. 3 credit(s). Prerequisite: 62.201
and COM Dean permission.

62.403 BUSINESS MARKETING

Special problems in marketing industrial goods.
Distribution channels, pricing policies, product line
planning and promotional strategy for companies mar-
keting to industrial firms, governmental agencies and
other organizations. 3 credit(s). Prerequisite: 62.201
and COM Dean permission.

62.405 SALES MANAGEMENT

Management of the personal selling function.
Principles of sales force organization, selection, train-
ing, compensation, supervision and motivation are
explored via appropriate cases. 3 credit(s).
Prerequisite: 62.201 and COM Dean permission.

62.406 PURCHASING AND MATERIALS MANAGEMENT

Purchasing procedures, inventory control, quality con-
trol, source selection, forward buying and speculation
for the production enterprise. 3 credit(s). Prerequisite:
62.201, BSBA or Business Minor students and COM
Dean Permission.

62.407 RETAILING

Development, organization and management of vari-
ous types of retailing institutions. Evaluation of retail
locations and contemporary retailing problems. 3
credit(s). Prerequisite: 62.201 and COM Dean permis-
sion.

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 onto ISIS, the Inter-Campus
Student Information System. 3 credit(s). Prerequisite:
62.201 and COM Dean permission.

63.210 OPERATIONS ANALYSIS TECHNIQUES

Introduction to quantitative methods for analyzing busi-
ness problems. Analytic methods include decision
analysis, linear programming, queuing and simulation.
Applications address issues in areas such as market-
ing, production, finance and logistics. 3 credit(s).
Prerequisite: 49.211.

63.300 APPLICATION SYSTEMS DEVELOPMENT

Provides an understanding of the fundamental con-
cepts of software application development for busi-
ness in an object-oriented, Graphical User Interface
(GUI) environment utilizing structured programming
concepts. Course involves hands-on application devel-
opment in a 4GL environment. 3 credit(s). Prerequisite:
COM filter courses, COM Dean permission.

63.301 MANAGEMENT INFORMATION SYSTEMS

Structure and foundations of information systems for
management from both a user's and designer's per-
spective. Students will also utilize application software
such as PeopleSoft and Microsoft Office for business
problem solving. 3 credit(s). Prerequisite: COM filter
courses, BSBA or Business Minor/BSIT/ASIT students
with 54+ credits, COM Dean permission.

63.307 SYSTEMS ANALYSIS AND DESIGN

An overview of the information system and systems
development life cycle (SDLC). Emphasis on tools and
techniques that analyst can use to document informa-
tion systems. Current, classical and structured tools
for describing data flow, data structure, process flow,
file design, input and output design and program appli-
cations will be discussed. 3 credit(s). Prerequisite:
63.300, 63.301, COM Dean permission.

63.371 OPERATIONS MANAGEMENT

Principles of production/operations management.
Nature and function of production systems; opera-
tional planning and control; plant layout; materials han-
dling; inventory and quality control. 3 credit(s).
Prerequisite: 63.210, BSBA students and COM Dean
Permission.

63.403 DATABASE MANAGEMENT SYSTEMS

An introduction to databases and Database
Management Systems (DBMS). Topics include basic
concepts of database technology, an introduction to
SQL, techniques for logical and physical database
design, interaction with a commercial DBMS, and data
warehousing. 3 credit(s). Prerequisite: 63.307 and
COM Dean permission.

63.404 DATA COMMUNICATIONS AND NETWORKING

A comprehensive overview of concepts and practice in
Business Data Communications and Networking.
Explores the principles and applications of data com-
munications in organizations from familiar applications
into the more technical aspects of telecom architec-
ture. Analyzes the various types of telecom networks,
and how they are designed and configured, including
issues involving the management and decision-making
process within the telecom department. Students pro-
vided with hands-on network administration and con-
figuration experience with a LAN administrator. 3
credit(s). Prerequisite: 63.307 and COM Dean permis-
sion.

63.407 ELECTRONIC BUSINESS

This course familiiarizes 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 founda-
tion for designing dynamic interactive websites for
electronic commerce. It addresses planning and devel-
oping 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 techology for business advantage; managing
electronic commerce funds transfer; reinventing the
future of business through electronic commerce; busi-
ness opportunities in electronic commerce; electronic
commerce website design; social, political and ethical
issues associated with electronic commerce; and busi-
ness plans for technology ventures. 3 credit(s).
Prerequisite: 63.307, 63.403, and COM Dean permis-
sion.

63.408 CURRENT TOPICS IN MANAGEMENT

INFORMATION SYSTEMS

This course addresses one or more current topics to the field of Management 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. 3 credit(s). Prerequisite: 63.307, COM senior standing, and COM Dean permission.

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. 3 credit(s). Prerequisite: COM filter courses, BSBA or Business Minor/BSIT/ASIT students with 54+ credits, and COM Dean permission.

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. 3 credit(s). Prerequisite: 66.301, BSBA or Bus. Minor students and COM Dean Permission.

66.410 NEGOTIATION STRATEGY AND TACTICS

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 spceific communication and decision-making behaviors during the actual bargaining; and the ability to recognize how one's onw personality, value system and perceptions affect the choice of tactics and behavior. 3 credit(s). Prerequisite: 66.301, BSBA students only, and COM Dean Permission.

66.415 MANAGING TEAMS AND PROJECTS

Provides students with the knowledge and skills to effectively manage in the more flexible, team-oriented environments increasingly found in contemporary organizations. Emphasis on the dynamics of groups and how they are transformed into productive teams; strategies for systematic goal setting; building team structure; using the team as a basis for problem-solving; facilitating team processes. The course focuses on today's smaller, "self-renewing" organizations, as well as on more traditional work group settings. 3 credit(s). Prerequisite: 66.301 and COM Dean permission.

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. 3 credit(s). Prerequisite: 66.301 and COM Dean permission.

66.425 ORGANIZATION DESIGN

Examines organization structures for their effectiveness in various business environments, and techniques for designing organizations and subunits. Focuses on the impact of information technology, globalization and other issues facing contemporary managers on organization design decisions. Addresses strategy, control, size, power and politics, culture, conflict, and innovation and change. 3 credit(s). Prerequisite: 66.301 and COM Dean permission.

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. 3 credit(s). Prerequisite: 66.301 and COM Dean permission.

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. 3 credit(s). Prerequisite: 66.301, BSBA students and COM Dean Permission.

66.440 INTERNATIONAL BUSINESS

Special problems of overseas operations of American firms. Financial, marketing, human resource, and legal problems of the multinational enterprise. State trading, economic integration and international regulatory agencies. 3 credit(s). Prerequisite: 49.202, 61.301, 62.301, 63.371, 66.301, and COM Dean permission.

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. 3 credit(s). Prerequisite: 66.301 and COM Dean permission.

66.480 CURRENT TOPICS IN MANAGEMENT

Topics of current interest in Management. Subject matter to be announced in advance. For a current semester course title, please log onto ISIS, the Inter-Campus Student Information System. 3 credit(s). Prerequisite: 66.301; BSBA students and COM Dean Permission.

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. 3 credit(s). Prerequisite: 96 credits and 61.301, 62.201, 63.371, 66.301, BSBA students and COM Dean Permission.

66.499 INDEPENDENT STUDY IN MANAGEMENT

An opportunity for the student to carry out individualized study relating to the field of management under

the supervision of a member of the faculty. 3 credit(s). Prerequisite: 66.301, Senior standing, permission of instructor, and COM Dean permission.

67.213 FINANCIAL ACCOUNTING II

A continuation of Financial Accounting I, this course examines in greater depth the underlying theory of financial statement preparation and the accounting, valuation and disclosure issues related to the reporting of assets. Emphasis is placed on the pronouncements of the Financial Accounting Standards Board. This course may include use of the computer. 3 credit(s). Prerequisite: 60.201 or 67.102, 90.202. Courses with the 67 prefix are not intended for students matriculating in the Bachelor of Science degree programs in the College of Management and may not transfer into the BSBA program. Not for BSBA.

67.214 FINANCIAL ACCOUNTING III

A continuation of Financial Accounting II, this course examines in greater depth the valuation and disclosure issues associated with the reporting of liabilities and stockholders equity. Emphasis is placed on the pronouncements of the Financial Accounting Standards Board. This course may include use of the computer. 3 credit(s). Prerequisite: 67.213. Courses with the 67 prefix are not intended for students matriculating in the Bachelor of Science degree programs in the College of Management and may not transfer into the BSBA program. Not for BSBA.

67.215 INTRODUCTION TO COST MANAGEMENT SYSTEMS

A decision-oriented examination of the decision-making process and its related management information needs. Traditional cost accounting and new cost management models will be explored and contrasted. The emphasis in this course will be on cost management systems that examine the manager's role in planning, managing, and reducing costs. This course may include use of the computer. 3 credit(s). Prerequisite: 60.202 and 90.202. Courses with the 67 prefix are not intended for students matriculating in the Bachelor of Science degree programs in the College of Management and may not transfer into the BSBA program. Not for BSBA

67.216 SURVEY OF PERSONAL FEDERAL INCOME TAXES

Examines the basic rules and regulations of the Internal Revenue Code as it effects the individual. An understanding of the code is developed through lectures, assigned readings, research, problem solving, and income tax form preparation. This course may include use of the computer. 3 credit(s). Prerequisite: 60.202 or 67.102, 90.202; not for BSBA students. Courses with the 67 prefix are not intended for students matriculating in the Bachelor of Science degree programs in the College of Management and may not transfer into the BSBA program. Not for BSBA.

67.217 COMPUTER APPLICATIONS IN ACCOUNTING

This course is designed to introduce students to accounting software used by many businesses. Spreadsheet software introduced in course 90.202 will be used to develop solutions to accounting problems such as depreciation schedules. Further, the student will be introduced to off-the-shelf general ledger accounting software through the use of a tutorial and additional accounting problems. 3 credit(s). Prerequisite: 90.202. Courses with the 67 prefix are not intended for students matriculating in the Bachelor of Science degree programs in the College of Management and may not transfer into the BSBA program. Not for BSBA.

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. 3 credit(s). Prerequisite: Macintosh proficiency. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.245 DESKTOP PUBLISHING: LAYOUT AND PRODUCTION (W/QUARKXPRESS)

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. 3 credit(s). Prerequisite: Basic Macintosh proficiency. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.251 2D DESIGN

Studies two-dimensional design principles and how they articulate structure, space and form. The development of visual ideas that relate to painting, sculpture, graphic arts, and architecture also will be covered. 3 credit(s). AE

70.255 DRAWING – FORM AND SPACE

Provides a foundation in basic drawing concepts using a variety of media and approaches. The emphasis is on building visual literacy and its application to the realm of ideas. A wide range of assignments are given to develop graphic expression. 3 credit(s). AE

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. 3 credit(s). Prerequisite: Basic Macintosh or Basic Windows proficiency. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for trans-

fer upon department approval.

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. 3 credit(s). Prerequisite: Basic Macintosh familiarity. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.265 COMPUTER ART I

An aesthetics and communications course using the computer as the primary tool for translating art ideas into physical form. The emphasis will be on practical usages of existing Macintosh software as a means of creation. 3 credit(s). Prerequisite: 70.251 and/or 70.255 or permission of the instructor.

70.271 PAINTING I

Presents oil painting techniques as vehicles for serious creative expression. A variety of assignments will be given to help the student build proficiency in the use of color, paint handling, and subject matter. 3 credit(s).

70.281 CERAMICS I

Introduces the student to the basic hand-building techniques, wheel throwing, and ceramic sculpture. The course will also examine clay, the material, glaze techniques, and firing processes. 3 credit(s).

70.291 INTRODUCTION TO GRAPHIC DESIGN

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. 3 credit(s). Prerequisite: Basic Macintosh or Windows proficiency. This course will not transfer directly into the Art Department's BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.297 STUDIO WORKSHOP

Presents a study of studio problems in visual structures and organization, as well as an exploration of various media and techniques. Topics will vary. This course may be repeated. 3 credit(s). 6 contact hours.

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. 3 credit(s). 3 contact hours. Prerequisite: 70.291 and 70.262 or comparable knowledge.

70.376 3D COMPUTER 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. 3 credit(s). Prerequisite: 70.264 or 90.231 or instructor permission. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.377 ADVANCED ANIMATION

This advanced-level course is designed for students who have completed 3D Computer Animation and who are interested in exploring the narrative possibilities in animation. Conceptual drawings and storyboarding will be required. The course will cover advanced sequencing, motion paths, editing, audio, and virtual environments. Special effects compositing will be introduced. Other course topics will include media preparation for output to film, video, and CD-ROM. Basic familiarity with Mac OS and/or Windows platforms required. 3 credit(s). Prerequisite: 70.376. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.378 INTERACTIVE GAME DESIGN

This course will introduce the student to the processes of game conceptualization and game prototyping. Immersive and interactive media will be explored. Interactive, engaging game design will be emphasized. Conceptual drawings, storyboarding, 3D modeling and multimedia authoring will be employed. Proficiency in 3D model building and familiarity with Mac OS and/or Windows platforms required. 3 credit(s). Prerequisite: 70.376, 70.377, and 90.233.

70.379 WEBSITE DESIGN

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. 3 credit(s). Prerequisite: 90.238, and 90.231 or 70.262.

70.381 ADVANCED GAME DESIGN

This advanced level course is designed for students who have completed Interactive Game Design and who are interested in exploring interactive game strategies and multilevel game design. Basic familiarity with Mac OS and/or Windows platforms required. 3 credit(s). Prerequisite: 70.376, 70.377, 70.378, and 90.233.

70.384 ADVANCED WEBSITE DESIGN AND DEVELOPMENT

This advanced-level course is designed for students who have completed Website Development (90.238) and 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. 3 credit(s). Prerequisite: 90.238 and 70.379.

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 streaming media delivery. This course will examine current technologies used to deliver audio, video, and multimedia via on-demand and live broadcasts utilizing both internet and intranet environments. Special attention will be made to emerging protocols and standards for streaming delivery. Bandwidth requirements, server configuration and setup, and content development will be covered in a hands-on environment. Familiarity with the Windows platform is required. 3 credit(s). Prerequisite: 70.379 or permission of instructor.

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 final stage and render it as a professional portfolio piece. 3 credit(s). Prerequisite: 70.291, 70.240, and 70.245 or permission of instructor. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

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. 3 credit(s). Prerequisite: 70.291, 70.240, and 70.264 or permission of instructor. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

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. 3 credit(s). Prerequisite: 70.291, 70.240, 70.245 and 70.391 or permission of instructor. This course will not transfer directly into the Art Department's BA/BFA day school degree program, but certain two-course clusters may be accepted for transfer upon department approval.

70.496 PRACTICUM EXPERIENCE/GAME DESIGN

The Practicum/Internship is an on-campus or off-campus learning experience. Specific requirements will vary depending on department policies and the nature of the program undertaken by the student. The practicum experience is to provide an occasion for practical experience in an area of particular interest to the student. 3 credit(s). Prerequisite: 70.377, 70.380.

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. 3 credit(s). Music Majors Only

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 71.101. Offered in summer only.

71.103 AURAL SKILLS 1

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 diatonic music. Music majors only. 1 credit(s). 2. contact hours. Corequisite: 71.101.

71.104 AURAL SKILLS 2

A continuation of Visual and Aural Perception of Music I requiring greater facility in the skills of perception and execution developed in the previous semester and the mastery of additional skills required to deal intellectually with notational and musical problems encountered in more sophisticated literature. A variety of clefs, beat subdivisions, artificial divisions, modal and modulating music, jazz and blues idioms as well as an introduction to non-diatonic music literature are included in the course. Harmonic dictation throughout the semester is correlated to Music Theory II. 3 credit(s). Prerequisite:

71.103.

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. For Non-Music majors only. 3 credit(s). AE

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. 3 credit(s). Prerequisite: 71.102.

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. 3 credit(s). Prerequisite: 71.201.

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. 1 credit(s). 2. contact hours. Prerequisite: 71.104. Offered in summer only.

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. 1 credit(s). 2. contact hours. Prerequisite: 71.203, 71.215, 71.216.

71.490 THEORY REVIEW 1

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. 3 credit(s). Prerequisite: 71.202. Credit cannot be applied towards any music degree.

71.491 THEORY REVIEW 2

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. 3 credit(s). Prerequisite: Credit cannot be applied toward any music degrees.

73.410 MULTICULTURAL MUSIC EDUCATION

Focus on the music education profession's response to multiculturalism in education as evidenced through the National Music Standards and an examination of resources and methodologies for teaching and understanding the music of diverse cultures, styles, and genres. As one of the core professional music education courses, the course includes the component of pre-practicum fieldwork. 3 credit(s).

73.414 K-12 CHORAL TECHNIQUES

This course focuses on practical and effective techniques and concepts to aid choral directors in rehearsing 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. XXX credit(s).

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. 3 credit(s).

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. 1 credit(s).

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. 3 credit(s). HSA

74.261 MUSIC HISTORY 1

Studies sacred and secular musical forms from pre-Christianity to 1750. 3 credit(s).

74.262 MUSIC HISTORY 2

Analyzes musical forms and styles from 1750 to present. 3 credit(s).

74.301 AMERICAN MUSIC

An historical, cultural and contextual survey of diverse styles of concert and vernacular music in the United States from the colonial era to the present. Open to music and non-music majors. 3 credit(s).

74.355 JAZZ

An intense study of the history of jazz from its origins to the present, covering a wide selection of styles and schools of jazz in various ensemble configurations. Open to non-music majors only. 3 credit(s).

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. 3 credit(s).

77.350 INTRODUCTION TO THE MUSIC INDUSTRY

Please contact our Faculty and Student Support Center at (978) 934-2407 for an updated course description. 3 credit(s).

77.499 MUSIC BUSINESS INTERNSHIP

Students will complete a 15-week internship at a company in the music industry which offers a varied, practical, and challenging learning experience. This internship will be supervised by a sponsor from the company and the coordinator of the music business program. 3 credit(s).

78.201 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. 3 credit(s).Prerequisite: Introduction to Multimedia or HTML recommended.

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. 3 credit(s).

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. 6 credit(s). Prerequisite: Permission of Chair.

79.352 AESTHETICS AND CRITICAL STUDIES OF CONTEMPORARY ART AND CULTURE

Examination of issues of content, theory, and criticism in contemporary and traditional art and culture. Topics vary. 3 credit(s). Prerequisite: 58.203, 58.204

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 selection 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. 3 credit(s). Corequisite: 81.113. SL

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. 3 credit(s). Prerequisite: 81.111. Corequisite: 81.114. SL

81.113 PRINCIPLES OF BIOLOGY I LABORATORY

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. 1 credit(s). 3 contact hours. Corequisite: 81.111. SL

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. 1 credit(s). 3 contact hours. Corequisite: 81.112. SL

81.215 INTRODUCTION TO MARINE BIOLOGY

Introduces the marine environment with major consideration given to the biological and ecological aspects. Emphasis is on the flora and fauna of New England. 3 credit(s). Corequisite: 81.217. SL

81.217 INTRODUCTION TO MARINE BIOLOGY LABORATORY

Emphasizes the material covered in 81.215 using a series of laboratory exercises and field trips. 1 credit(s). 3 contact hours. Corequisite: 81.215. SL

81.252 PHYSIOLOGY

Presents a comprehensive study of the fundamental mechanisms governing mammalian physiology. The role of cell physiology in determining systemic functions and coordinating biological control systems will be emphasized. Maintenance of homeostasis will be discussed in terms of biochemical, cytological, anatomical, and physical principles. 3 credit(s).

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. 3 credit(s). Corequisite: 81.322.

81.322 BOTANY LABORATORY

Emphasizes material covered in 81.320 using field and laboratory exercises. 1 credit(s). 3 contact hours. Corequisite: 81.320.

81.327 HISTOLOGY

An introduction to the microscopic structure of animal tissues with emphasis upon human histology. Laboratory investigation is an integral part of the courses. 3 credit(s). Prerequisite: 81.111, 81.112, 81.113. Corequisite: 81.329.

81.329 HISTOLOGY LAB

A series of laboratory exercises designed to emphasize the material covered in 81.327. 1 credit(s). 3 contact hours. Corequisite: 81.327.

81.347 BIOLOGY OF NUTRITION

Emphasizes fundamental physiological and biochemical principles of human nutrition. Students will have an opportunity to compare their present dietary practices with recommended dietary allowances, goals, and guidelines. Nutrient excesses and inadequacies during various stages of the life cycle (pregnancy, infancy, childhood, adolescence, adulthood, old age) will be considered. Current concepts and controversies in nutrition research, surveys, and methods will also be evaluated. 3 credit(s). Prerequisite: 81.111 or permission of instructor.

81.419 PRINCIPLES OF BIOCHEMISTRY I

Studies the structure and properties of proteins, carbohydrates, and lipids which combined with a discussion of elementary enzymology allows for detailed descrip-

tions of several important degradative and biosynthetic pathways, their integration and regulation. Throughout the course, emphasis is on methods and practical application of fundamental information to the solution of problems of current biomedical interest. 3 credit(s). Prerequisite: 84.221. Recommended: 84.344.

81.430 INTRODUCTION TO BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

Course introduces the field of Bioinformatics and its fundamental purpose in sequence analysis and gene discovery. Is intended for individuals with a background in biology and, ideally, some aptitude in computer programming. Course briefly provides broad overview of bioinformatics with regard to where problems lie and what the field is trying to accomplish. It hen focuses specifically on DNA and protein sequence analysis to help identify genes and their possible functions. Tools reviewed include those dealing with pairwise alignments, multiple sequence alignments, phylogenetic comparisons, gene prediction, pattern matching, and clustering algorithms. Survey of some of the tools available via the WWW will also be provided. 3 credit(s). Prerequisite: Two of the following courses: Microbiology, Genetics, Biochemistry, Molecular Biology, Recombinant DNA.

81.476 CELL CULTURE LECTURE

Lectures and readings on the biology and culture of animal and plant cells in vitro. Students are introduced to methodologies utilized in employed biomedical research laboratories as well as the biotechnology industry. 2 credit(s). Prerequisite: 81.335, 81.419 (and 81.493 or permission of instructor). Corequisite: 81.478.

81.478 CELL CULTURE LAB

A series of exercises demonstrating the principles presented in 81.476. Techniques will include: media preparation, standard culture procedures. 2 credit(s). 3 contact hours. Corequisite: 81.476.

83.100 INTRODUCTION TO BIOLOGY

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life. 3 credit(s). Prerequisite: Not for Biology majors. SC

83.101 LIFE SCIENCE I

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life. 3 credit(s). Corequisite: 83.103. SC

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. 3 credit(s). Corequisite: 83.104. SL

83.103 LIFE SCIENCE LABORATORY I

Concerned with experimentation and interpretation of some of the concepts of Life Science I. 1 credit(s). 2 contact hours. Corequisite: 83.101. SL

83.104 LIFE SCIENCE LABORATORY II

Involved with experimentation and interpretation of some of the concepts of Life Science II. 1 credit(s). Corequisite: 83.102. SL

83.105 INTRODUCTION TO BIOLOGY LAB

Concerned with experimentation and interpretation of some of the concepts of Life Science I. 1 credit(s). 3 contact hours. Prerequisite: C: 83.100; not for Biology majors. SL

83.123 NUTRITION AND DISEASE

Serves as an interdisciplinary survey course for students not majoring in Biology, which deals with human nutrition as it relates to various chronic disease states. Methods of detection and treatment of the disorders will be considered as well as general concepts of health promotion/disease prevention. Specific topics covered include the role of nutrition in: heart disease, diabetes, alcoholism, obesity, senility-geriatrics, gallbladder disease, cancer, anorexia nervosa-bulimia, and pregnancy. 3 credit(s). SL

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. 3 credit(s). SC

83.127 PLANTS AND HUMAN SOCIETY LABORATORY

Plants and Human Society Laboratory has been designed primarily to fulfill the science laboratory 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 every day world. Since this laboratory course is designed to accompany the online lecture course, you must either be currently enrolled in Plants and Human Society or have already completed the Plants and Human Society online lecture course with a passing grade in order to be allowed to take this laboratory course. Prerequisite or corequisite: 83.125. 1 credit(s), 3 contact hours. SL

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. 3 credit(s). SL

83.256 EVOLUTION, RELIGION, AND MODERN SOCIETY

This course is designed to appreciate the impact that the idea of evolution has had on contemporary thought. Darwin's ideas have generated major impacts and controversy on our society. Some major religious views were challenged by Darwin's ideas, and different religious groups have responded differently to these challenges. Knowledge about human evolution will explain the meaning of life and how we got here. 3 credit(s).

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. 3 credit(s). SL

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. 3 credit(s). Corequisite: 84.113. SL

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. 3 credit(s). Prerequisite: 84.111 or permission of instructor. Corequisite: 84.114. SL

84.113 GENERAL CHEMISTRY LABORATORY I

Lab experiments designed to illustrate the principles covered in 84.111. 1 credit(s). 3 contact hours. Corequisite: 84.111. SL

84.114 GENERAL CHEMISTRY LABORATORY II

Uses laboratory experiments designed to illustrate the principles discussed in 84.112. 1 credit(s). Prerequisite: 84.113 or permission of instructor. Corequisite: 84.112. SL

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. 3 credit(s). Corequisite: 84.123. SL

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. 3 credit(s). Prerequisite: 84.121 and 84.123. Corequisite: 84.124. SL

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 1 credit(s). 3 contact hours. Corequisite: 84.121. SL

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. 1 credit(s). 3 contact hours. Corequisite: 84.122. SL

84.221 ORGANIC CHEMISTRY I

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. 3 credit(s). Prerequisite: 84.122 and 84.124. Corequisite: 84.227 or 84.229.

84.222 ORGANIC CHEMISTRY II

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. 3 credit(s). Prerequisite: 84.221. Corequisite: 84.228 or 84.230. SL

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. 1 credit(s). Corequisite: 84.221.

84.230 ORGANIC CHEMISTRY LABORATORY IIA

A continuation of 84.229. 1 credit(s). 4 contact hours. Prerequisite: 84.229. Corequisite 84.222. SL

85.141 WEATHER AND CLIMATE

Serves as a general meteorology course for the non-science major. Topics include: atmospheric composition, solar radiation, temperature, moisture and condensation relationship between air pressure and wind, weather patterns, severe weather, optical phenomena in the atmosphere, and the behavior and possible change of climate. 3 credit(s). SC

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. 3 credit(s). Prerequisite: 84.122. Corequisite: 86.225. SL

86.224 PRINCIPLES OF ORGANIC CHEMISTRY II

Serves as a continuation of 86.223. 3 credit(s). Prerequisite: 86.223. Corequisite: 86.226 or permission of coordinator. SL

86.225 PRINCIPLES OF ORGANIC CHEMISTRY LABORATORY I

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. 1 credit(s). 4 contact hours. Corequisite: 86.223. SL

86.226 PRINCIPLES OF ORGANIC CHEMISTRY LABORATORY II

Serves as a continuation of 86.225. 1 credit(s). 4 contact hours. Prerequisite: 86.225. Corequisite: 86.224. SL

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. 3 credit(s). SC

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 I,II(0,2)1 1 credit(s). 2 contact hours.

88.101 WORLD AND REGIONAL GEOGRAPHY

Surveys the significance, characteristics, and principal geographic problems of the world's major regions. 3 credit(s).

89.101 GENERAL GEOLOGY I

Presents a study of the earth with emphasis on earth materials, earth structure (crustal and internal), earth history, and the development of life. Designed for the general student. 3 credit(s).

89.102 GENERAL GEOLOGY II

Studies the earth with emphasis on the surface of the earth and land form development. Includes special topics introducing the student to recent geological research and applied geological knowledge. Designed for the general student. 3 credit(s).

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. 3 credit(s).

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, and inequalities, quadratic functions, and matrices. Credit is not given for both 90.112 and 92.120. 3 credit(s). Prerequisite: 90.111 or satisfactory score on the Math Placement Exam given the first week of class.

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. 3 credit(s). Prerequisite: 90.112. MA

90.160 INTRODUCTION TO INFORMATION SYSTEMS

Provides the 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. 3 credit(s).

90.171 APPLICATIONS SOFTWARE: ACCESS

This introductory course is intended to teach students how to create and manipulate database files using Microsoft Access. 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. 3 credit(s).

90.172 APPLICATIONS SOFTWARE: WINDOWS

Provides hands-on experience in Windows development. Topics covered include: creating and displaying text in a window, controls (buttons, list boxes, edit controls, etc.), dialog boxes, menus and string resources, memory management, DLLs, MDIs, and DDE. Knowledge of C++ is helpful but not essential. Emphasis will be placed on the ability to use an existing class library (MFC) to speed up Windows projects significantly. 3 credit(s).

90.180 APPLICATIONS SOFTWARE: 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. 3 credit(s).Prerequisite: 90.202 or equivalent; requires Microsoft Excel 2003.

90.202 INTRODUCTION TO PERSONAL COMPUTERS AND 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. 3 credit(s). Prerequisite: Requires MS Office XP or higher.

90.211 INTRODUCTION TO PROGRAMMING WITH C - PART 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. 3 credit(s). Prerequisite: No previous programming experience required.

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. 3 credit(s). Prerequisite: 90.211.

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. 3 credit(s).

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. 3 credit(s).

Prerequisite: 90.220.

90.227 DEVELOPING INTERACTIVE HELP SYSTEMS

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. 3 credit(s). Prerequisite: Familiarity with technical writing and/or web/multimedia development.. 3 credit(s).

90.228 INTRODUCTION TO ADOBE FRAMEMAKER

This instroductory 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. 3 credit(s).

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. 3 credit(s). Prerequisite: Basic Macintosh or Windows proficiency.

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, navigation bars, and background images to communicate creative visual information. Photoshop will be used. 3 credit(s). Prerequisite: 90.230. Formerly Graphics for Multimedia.

90.232 DESKTOP VIDEO PRODUCTION

This course will focus on introductory desktop video production techniques. Using desktop editing software, students will complete projects including photo montages, interview sequences, storyboarding, pre-production planning and a five minute final project. Some experience with PhotoShop or similar software and access to a digital still camera or scanner is helpful for success in this course.   3 credit(s). Prerequisite: 90.230.

90.233 MULTIMEDIA AUTHORING SOFTWARE: USING

MACROMEDIA DIRECTOR

This course will focus on developing interactive projects using Macromedia Director. Participants will create interactive events, explore computer animation, and integrate these with video, text, and audio for use in presentations, education, and marketing. 3 credit(s). Prerequisite: 90.230.

90.234 DESIGNING AND DEVELOPING INTERACTIVE MEDIA

The focus of this course is to develop appropriate interactive media products and services. Students will develop one product or service concept by meeting with potential end users and discovering what their product/service needs are. Information is analyzed and leads to the designing and prototyping of a new service/product concept. Course includes project design, storyboarding, scripting, shooting video, and desktop video editing. The process will allow students to explore in a practical way what makes for good multimedia design, interactivity, navigation, digital video and audio, screen and interface design. Serves as an ideal portfolio builder for participants seeking employment in the field. 3 credit(s). Prerequisite: 90.230, 90.231, 90.232, 90.233 or permission of instructor.

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. 3 credit(s). Prerequisite: 90.230 or permission of instructor.

90.237 TOPICS IN MULTIMEDIA

Selected topics and issues in the latest technology and state-of-the-art developments in multimedia will be covered. 3 credit(s). Prerequisite: 90.230 or permission of instructor.

90.238 WEBSITE DEVELOPMENT: FRONTPAGE

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. 3 credit(s). Prerequisite: 90.291; 90.231 recommended. Formerly Designing Multimedia for the World Wide Web

90.239 MULTIMEDIA SCRIPTING USING MACROMEDIA DIRECTOR'S LINGO

This advanced course is for students who have already mastered Director basics and wish to explore Macromedia Director's scripting language Lingo, along with basic programming techniques. Lingo's interactive design allows for evaluation and response to user actions. Course includes programming concepts, play-

back of QuickTime movies, control of CD-ROM drives, text manipulation, working with external files, X Objects, Sprite control, etc. 3 credit(s). Prerequisite: 90.233.

90.240 MULTIMEDIA AUTHORING SOFTWARE USING ICONAUTHOR

This course will teach students to develop interactive multimedia projects using Aimtech's IconAuthor software. IconAuthor - long used by business and industry to create CBT, performance support systems, and multimedia kiosks - supports a range of multimedia formats as well as Internet delivery of multimedia content. 3 credit(s). Prerequisite: 90.230 or permission of instructor.

90.245 WEBSITE SERVER ADMINISTRATION

This course provides participants with an overview of the features that make up a web server as well as the information needed to implement and support a web server. The course covers the most popular industry web server products. Topics include: planning, installation, and configuration, configuring and managing resource access, integration and interoperability, running applications, monitoring and optimization, troubleshooting, HyperText Transfer Protocol, platform selection and tradeoffs. 3 credit(s). Prerequisite: 90.238.

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 component; basic SQL commands; and debugging techniques. 3 credit(s). Prerequisite: HTML and previous programming experience required.

90.247 WEB AUTHORING: FLASH MX

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. 3 credit(s). Prerequisite: 90.291; 90.302 or programming familiarity.

90.248 WEBSITE DATABASE IMPLEMENTATION

The growth of the Internet and the World Wide Web has created a platform-independent software model that will enable enterprise information and applications to be accessed by a large number of people using a variety of devices. This course focuses on current methods required to migrate existing database transaction systems to the Web's thin-client architecture. Application server technology capable of deploying real business database applications on the web will be examined. This course will explore effective uses of middleware object brokers such as CORBA that tie front-end web servers, user web browsers, and back-end databases together to create a heterogeneous

system for the enterprise. Issues such as integrated security, reliability, and scalability will be reviewed. Students will learn how to create and deploy a web-based database application using Sybase's Powerbuilder database application development tools. 3 credit(s). Prerequisite: 90.474 or equivalent.

90.249 DEVELOPING IT TRAINING FOR THE WEB

This course focuses on the design, development, and implementation of web-based IT training systems. This course is especially designed for those interested in developing new delivery methods for corporate training. Site design and navigation are stressed with an emphasis on training and knowledge transfer applications. Available tools for automation and administration are also examined. 3 credit(s). Prerequisite: 90.230.

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. 3 credit(s). Prerequisite: 90.238.

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. 3 credit(s). Prerequisite: Previous programming experience. Students may not receive credit for both the 90.211/90.212 sequence and 90.267.

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. 3 credit(s). Prerequisite: 90.267 or 90.212.

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. 3 credit(s). Prerequisite: 90.268, experience with Data Structures.

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 applica-

tions 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, multi-threaded programming, dynamic link libraries (dlls). Course will discuss interoperability with other languages (C# and VB) and with other software. 3 credit(s). Prerequisite: 90.268.

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# lanaguage. Some of the topics that will be discussed in the course are: object-oriented programming, graphical-user-interface concepts, event driven programming, multithreading and World Wide Web-based client/server networking, relational database models and distributed computing. 3 credit(s). Prerequisite: 90.268 or 90.301.

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 90.291.

90.297 INTRODUCTION TO JAVA (TM)

This course introduces students to object oriented programming with Java $^{(TM)}$. 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 $^{(TM)}$ Development Kit. 3 credit(s). Prerequisite: Previous programming experience required.

90.301 JAVA PROGRAMMING

The JAVA $^{(TM)}$ programming language is now being used to write distributed Internet applications. Unlike traditional languages, the JAVA $^{(TM)}$ 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 $^{(TM)}$ apart from traditional programming languages; obtain an overview of object-oriented design as it applies to JAVA $^{(TM)}$; learn about the fundamental constructs of the JAVA (TM) programming language; and write, compile, and include simple JAVA $^{(TM)}$ Applets within the content of HTML documents. 3 credit(s). Prerequisite: 90.297 or 90.268.

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. 3 credit(s). Prerequisite: 90.291 or knowledge of HTML.

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 course website. 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. 3 credit(s). Prerequisite: 90.301.

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. 3 credit(s). Prerequisite: 90.267.

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. 3 credit(s). Prerequisite: 90.291 or a mastery of HTML and be familiar with database concepts.

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. 3 credit(s). Prerequisites: 90.303, 90.306.

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. 3 credit(s).

90.312 SHELL SCRIPTING

Teaches the students the techniques of programming in the high-level programming languages 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 utilties for computers running either UNIX, Linus, or the Cygwin environment on Windows. 3 credit(s). Prerequisite: 90.311, and 90.267 or 90.212.

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. 3 credit(s). Prerequisite: 90.312.

90.314 UNIX SYSTEM INTERFACE PROGRAMMING

Introduces a UNIX programmer to the tools which are necessary to take advantage of all the facilities provided by the UNIX operating system. Use of system calls as well as the pros and cons of using direct system calls on the C library routines will be discussed. 3 credit(s). Prerequisite: 90.311 and 90.455.

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. 3 credit(s). Prerequisite: 90.312.

90.317 DEVELOPING PORTABLE APPLICATIONS

Addresses programmers who are required to port code or move programs between various platforms and environments. 3 credit(s). Prerequisite: 90.311.

90.318 ADVANCED UNIX INTERNALS/TUNING

This course provides an overview of performance and tuning principles and tools in the UNIX operating system. The course covers principles of performance analysis and usage of performance measurement tools, such as sar, vmstat, iostat, and nfsstat. Coverage is given on how to identify memory, I/O, and CPU bottlenecks, and it gives recommended solutions. Since knowledge of several of the major OS kernel subsystems is required to understand the information provided by the performance monitoring tools, the course provides an in-depth view of the operating system's major kernel subsystems. These include virtual memory system, process lifetime cycles and scheduling and the UNIX file system. The course will describe the kernel subsystems of a typical UNIX operating system and as needed, add the differences between the different flavors of UNIX, such as BSD and SYSTEM V. The course will also include some simple rules of thumb to guide the tuning process. 3 credit(s). Prerequisite: 90.313.

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. 3 credit(s).

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++. 3 credit(s). Prerequisite: 90.319; requires Red Hat Standard Ed. Version 8.0.

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. 3 credit(s). Prerequisites: Shell scripting experience.

90.340 INTRODUCTION TO THE APPLICATION AND DEVELOPMENT OF INTRANETS

This course provides an overview of Intranet develop-

course descriptions

ment and application. Course topics include organizational analysis and planning, electronic commerce strategy, project development and management, hardware/software considerations, and Intranet deployment and training. Students will study a range of Intranet sites in an attempt to first familiarize themselves with Intranet possibilities and then to discern appropriate Intranet development. This course provides students with foundation from which to add additional technical skills. 3 credit(s). Prerequisite: 91.113 or equivalent.

90.341 INTRANET APPLICATIONS FOR THE ORGANIZATION

This course introduces students to specific network based collaborative applications, identifying the strengths, limitations and appropriate use of specific products in various organizational applications. Students will examine the application of specific collaborative applications to a range of functional organizational groups. This course provides students with a knowledge of specific collaborative workplace products and their application to organizational Intranets. 3 credit(s). Prerequisite: 90.340.

90.342 WEB-ENABLED DATABASE DEVELOPMENT

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. 3 credit(s). Prerequisite: 90.474.

90.347 RICH WEB DEVELOPMENT WITH FLASH MX – ADVANCED

This course picks up where other Flash courses end. Go beyond developng animations; learn how to use Flash to develop complete interatctive 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 Fllash Database Integration. 3 credit(s). Prerequisite: 90.247.

90.348 DEVELOPING DYNAMIC WEBSITES WITH COLDFUSION MX

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. 3 credit(s). Prerequisite: 70.379 and 70.384, or prior familiarity with Dreamweaver.

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. 3 credit(s). Prerequisite: 90.267 or 90.212, and 90.364.

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. 3 credit(s). Prerequisite: 90.212 or 90.267.

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..A good familiarity with the use of the Internet and computers is required and some knowledge of TCP/IP would be helpful. 3 credits(s). Prerequisite: 90.160 and 90.202, or equivalent.

90.388 PRINCIPLES OF SOFTWARE QUALITY ASSURANCE

Provides the student with a basic understanding of the elements of an effective Software Quality Assurance (SQA) program. Successful completion of the course work will enable the student to contribute to the development and management of an SQA organization. Topics include general quality control, software applications, standards and program organization, personnel requirements, configuration management and controls, integrating SQA and MIS effectively, and statistical principles and techniques. 3 credit(s). Prerequisite: 92.183 and a minimum of two computer programming courses.

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

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Microsoft tools, such as Microsoft Transaction Server and COM+. This course opens the door to these technologies. 3 credit(s). Prerequisite: 90.269.

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. 3 credit(s).

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. 3 credit(s). Prerequisite: 90.474.

90.448 ORACLE 10G 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. 3 credit(s).

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. 3 credit(s).

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. 3 credit(s).

90.451 ORACLE DATABASE DESIGN

This course is an introduction to the Oracle Relational Database Management System. Concepts of relational databases and normalization are covered. Students work with interactive tools and manipulate tables in a database. Oracle tools are used to create forms for input of data into the database and for the generation reports from information in the database. 3 credit(s). Prerequisite: 90.474.

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: 90.450 or related experience. 3 credit(s).

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. 3 credit(s).

90.455 DATABASE ADMINISTRATION III: ORACLE 10G PROJECTS

Designed as a capstone course, students will build upon concepts learned in 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: 90.450 and 90.453, or instructor permission. 3 credit(s).

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. 3 credit(s). Prerequisite: Junior standing or permission of instructor.

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. 3 credit(s). Prerequisite: 90.462 or related experience.

90.458 ADVANCED TOPICS IN COMPUTER SECURITY

An opportunity for students to study a selected topic of computer security in depth. The topic will be announced each semester and will be one of the following subjects: database security, network security, operating system security, cryptography and risk analysis, performing a security audit, and producing a com-

puter security policy. Class may be repeated for credit when topics vary. 3 credit(s). Prerequisite: 90.457 Computer Ethics and Security or Permission of Instructor.

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. 3 credit(s).

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. 3 credit(s). VC

90.461 LAN/WAN TECHNOLOGIES

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. 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. 3 credit(s). Prerequisite: 90.267 or previous programming experience.

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. 3 credit(s). Prerequisite: 90.461.

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 manage-

ment; LAN emulation and ATM migration; IP over ATM; IP switching; and Gigabit Ethernet. 3 credit(s). Prerequisite: 90.461.

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. 3 credit(s). Prerequisite: 90.461.

90.465 STORAGE AREA NETWORKS

The course focuses on Storage Area Networks (SAN) and IP SAN from a system's approach and provides an in-depth understanding of the various protocols and the hardware involved, building up the student skill and knowledge to design, evaluate and deploy SAN and IP SAN solutions. With the background that this course builds up, the student can find a challenging career as network engineer providing network administration, design and troubleshooting for small to large Enterprise Networks, local and global service providers and opens the door to SAN-related hardware and software development and deployment. 3 credit(s). Prerequisite: 90.461 and 90.462, or working knowledge on LAN/WAN technologies and TCP/IP network.

90.466 ORACLE 10G DATA WAREHOUSING

This course introduces students to the fundamentals of Data Warehousing. Upon completion, students should be able to guide a Data Warehousing project and avoid common pitfalls of implementation. The course provides an overview of the topic, comparing and contrasting it to other data management techniques to define how it is implemented and used. The course then drills into the topics that make up a data warehouse: Dimensions, Hierarchies, Facts/Cubes, Data Marts and Summary (OLAP) techniques, and ETL. Throughout the course, attention will be given to life-cycle concerns. Case studies of several functional areas will be covered to illustrate particular patterns or techniques. Students will build models utilizing the Oracle 10g database platform. 3 credit(s).

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: 90.459. 3 credit(s).

90.468 ADVANCED IP ROUTING

Advanced IP Routing focuses on IP routing protocols and principles not covered in the prerequisite courses.

Primary emphasis is give to theory, configuration, operation and support of the OSPF protocol. Special considerations are given to OSPF areas, summary ranges and external routes. This course also includes a review of address masks, RIP, RIP 2, the use and configuration of IP route policy filters and an introduction to BGP and its basic configuration. Through hands-on exercises, this course provides you with the necessary skills to configure and manage OSPF, RIP, BGP and route policy filters. 3 credit(s). Prerequisite: 92.465 and 90.466

90.469 COMPILER CONSTRUCTION TECHNIQUES

Studies typical compiler organization including symbol tables, various types of scans, object code generation, error diagnostics and optimization techniques. Segments of a classroom compiler are written by students. 3 credit(s). Prerequisite: 92.462.

90.470 DATA/TELECOMMUNICATIONS

Examines data transmission, media, data encoding, digital data communication techniques, data link control, modems, PC communications software, multiplexing, communication networking techniques, and an introduction to local area networks. 3 credit(s). Prerequisite: 90.267.

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 data base. 3 credit(s). Prerequisite: 90.267.

90.476 COMPUTER ORGANIZATION

Presents the computer architecture knowledge the software engineer needs. Students are introduced to the representation of information and the concepts of gates and elementary logic. Storage mechanisms and memory organizations are described and a functional layout of an elementary computer is given. Addressing methods are explained and various methods of I/O are discussed. Microprocessors, large computers, parallelism, and distributed logic are also covered. 3 credit(s). Prerequisite: 90.267, 92.455.

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. 3 credit(s). Prerequisite: Junior status.

90.478 INFORMATION SYSTEMS II

Serves as a continuation of 90.477, 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. 3 credit(s). Prerequisite: 90.477.

90.479 ORACLE 11I APPLICATIONS DBA

Building on the fundamentals of database technology learned in 90.450 and 90.453, this course focuses on Oracle DBA roles and responsibilities in an Oracle 11i applications environment. The course closely examines the Oracle 11i database architecture focusing on Oracle 11i database software installation, capacity planning, database configuration, database tuning, and upgrade and patching maintenance. Students are exposed to 11i-specific tools such as the Concurrent Manager and Enterprise Manager Console. The course also reviews Oracle 11i application modules used in typical implementations to meet today's business requirements. Prerequisite: 90.450, 90.453. 3 credit(s).

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. 6 credit(s). Prerequisite: Junior status.

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 include: introduction to mobile network architectures, 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. 3 credit(s). Prerequisite: 90.463 or instructor permission.

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 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). 3 credit(s). Prerequisite: 90.463 or instructor permission.

90.486 MULTIPROTOCOL LABEL SWITCHING (MPLS)

MPLS fundamental concepts; enhancing routing functionality with MPLS; MPSL and QoS support; implementing layer 2 and layer 3 VPNs with MPLS; MPLS in the metro; MPLS in the access; voice over MPLS. 3 credit(s). Prerequisite: 90.462.

90.490 INTRANET PRACTICUM/INTERNSHIP

Requires assigned fieldwork under the supervision and with the permission of the program coordinator. This course is designed to broaden the educational experience of the student by providing exposure to the application and use of the course material within the certificate curriculum. 3 credit(s).

91.101 COMPUTING I

An introduction to computer science with an emphasis on learning the C programming language. Basic Syntax and constructs such as conditionals, loops, function cells, File I/O, arrays, and pointers. Ethical and social values. 4 credit(s).

91.102 COMPUTING II

Discusses ordered lists and rings, binary and AVL trees, advanced sorting via quicksort, heapsort, etc., sets, hashing, characters, strings, and graphs. Also gives an introduction to files, programming style, documentation, and testing. Ethical and social aspects of computing will be explored as special topics. 4 credit(s). Prerequisite: 91.101.

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. 3 credit(s). Non-CS Majors only.

91.203 COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE

Presents the organization and operation of a conventional computer, including principal instruction types, data representation, addressing modes, program control, I/O, assembly language programming, including instruction mnemonics, symbolic addresses, assembler directives, system calls, and macros, the usage of text editors, symbolic debuggers, and loaders, and the use of pseudocode in guiding structured assembly language programming. 4 credit(s). Prerequisite: 91.101.

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. 4 credit(s). Prerequisite: Some previous programming experience.

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. 3 credit(s). Prerequisite: Two years of high school algebra; Liberal Arts majors only. No credit toward a degree in science or engineering. MA

92.120 PRECALCULUS MATHEMATICS

Intended for students whose background in basic algebra is current. The course objective is to provide students with the 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: 90.111 or equivalent or satisfactory score on the Math Placement Exam given the first week of class. Credit is only given for one of the three following courses: 90.119, 92.120 or 92.121. For students in the Information Technology Program, 92.120 can be substituted for the combination of 90.112 and 90.119; MA.

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. 3 credit(s). Prerequisite: No credit for math/science/engineering majors.

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. 3 credit(s). Prerequisite: 92.119 or 92.120 or equivalent; not for science or engineering majors. No credit toward degree in science or engineering. Students may receive credit for only one of the following courses: 92.122, 19.125, or 92.131. MA

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. 3 credit(s). Prerequisite: 92.120. Students may not receive credit for both 92.123 and 92.124. MA

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 92.120 and 92.123. 3 credit(s). Prerequisite: Recent knowledge of high school Algebra II. Students may not receive credit for both 92.123 and 92.124. MA

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. 3 credit(s). Prerequisite: 92.123. Students may receive credit for only one of the following courses: 92.122, 19.125, or 92.131. MA

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. 3 credit(s). Prerequisite: 92.125. MA

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. 4 credit(s). Prerequisite: Offered in summer only. MA

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. 4 credit(s). Students may receive credit for only one of the following courses: 92.122, 92.125, or 92.131. MA

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. 4 credit(s). Prerequisite: 92.131. MA

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 discretion of each instructor from a wide variety of inter-

esting and illustrative fields of mathematics. No credit toward degree in science or engineering. 3 credit(s). MA

92.183 INTRODUCTION TO STATISTICS

An introductory course which will introduce the following topics: descriptive statistics including central tendency, variability, graphing and data analysis; probability laws, discrete and continuous probability distribution; correlation and regression; and inferential statistics. May not be taken for credit along with 92.283, 92.385 or 92.386. May not be used to satisfy Mathematics major requirements. 3 credit(s). Prerequisite: 90.111 or equivalent. MA

92.216 HISTORY OF MATHEMATICS

An investigation of creative mathematics through the lives of mathematicians from classical times to the present. 3 credit(s). Prerequisite: 90.111 or equivalent. MA

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. 3 credit(s). Prerequisite: 92.225 and 92.321 or permission of coordinator.

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. 3 credit(s). Prerequisite: 92.221.

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. 3 credit(s). Prerequisite: 92.126. MA

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. 3 credit(s). Prerequisite: 92.225. MA

92.231 CALCULUS III

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. 4 credit(s). Prerequisite: 92.132. MA

92.234 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. 3 credit(s). Prerequisite: 92.225 or 92.132. MA

92.283 STATISTICS FOR BEHAVIORAL SCIENCES

An introduction to basic statistics as used in the behavioral sciences including descriptive statistics, sampling, the normal distribution, correlation and regression, and inferential statistics, including t-tests, F-tests, Chi-square tests and analysis of variance. The course also includes computer methods for solution of problems. May not be taken for credit along with 92.183 or 92.386. 3 credit(s). Prerequisite: 92.120 or equivalent.

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. 3 credit(s). Prerequisite: 92.226 or 92.231.

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. 3 credit(s). Prerequisite: 92.234.

92.305 INTRODUCTION TO REAL ANALYSIS I

Presents real and complex number systems. Sequences and series of complex numbers. Theory of metric spaces: completeness, compactness, continuity, uniform continuity. Differentiability of functions, and Taylor's Theorem. 3 credit(s). Prerequisite: 92.221, 92.225.

92.306 INTRODUCTION TO REAL ANALYSIS II

Studies the sequences and series of functions, uniform convergence, elementary functions, and the functions between Euclidean Spaces: the derivative as a linear map, the Jacobian, inverse function theorem, implicit theorem, Taylor's theorem. Integration of real valued functions on Euclidean space, fundamental theorem of the integral calculus, and the change of variables formula will also be covered. 3 credit(s). Prerequisite: 92.305.

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. 3 credit(s). Prerequisite: 92.231.

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. 3 credit(s). Prerequisite: 90.112 or 92.120.

92.322 DISCRETE STRUCTURES II

Examines graph theory, trees, algebraic systems, Boolean algebra, groups, monoids, automata, rings and fields, applications to coding theory, logic design, and sorting. 3 credit(s). Prerequisite: 92.321.

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. 3 credit(s). Prerequisite: 92.225 or 92.231, 92.234 and a knowledge of one programming language.

92.363 INTRODUCTION 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. 3 credit(s). Prerequisite: 92.183 or equivalent. MA

92.381 INTRODUCTION TO OPERATIONS RESEARCH TECHNIQUES I

Studies the use of decision models in industrial systems, fundamentals of probability and matrix theory, critical path methods, linear programming, the simplex method, sensitivity analysis, goal programming, transportation and assignment models, and integer programming. 3 credit(s). Prerequisite: 92.126 or 92.131.

92.382 INTRODUCTION TO OPERATIONS RESEARCH TECHNIQUES II

Serves as a continuation of 92.381. Topics include: inventory control models, Markov analysis, queuing models, dynamic programming, network analysis, and simulation techniques. 3 credit(s). Prerequisite: 92.381.

92.385 APPLIED STATISTICS

Introduction to experimental design, data analysis and formal statistical procedures from an applied point of view. 3 credit(s). Prerequisite: 92.126.

92.386 STATISTICS FOR SCIENCE AND ENGINEERING

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. 3 credit(s). Prerequisite: 92.225 or 92.132.

92.401 APPLIED MATHEMATICS AND MODELING

Studies realistic problems in order to teach students how mathematics can be applied to models and situations existing around us. Examples are population dynamics, traffic flow, epidemics and dynamic problems such as planetary motion and harmonic oscillation. Basic mathematical techniques will be applied, and mathematical models will be 'built' to describe particular problem behavior. Solutions can then be interpreted and information can be learned from them. In studying such methods we will expand our knowledge of calculus, linear algebra and differential equations. 3 credit(s). Prerequisite: 92.226, 92.221 and 92.234.

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. 3 credit(s). Prerequisite: 92.126 or 92.132 or equivalent.

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. 3 credit(s). Prerequisite: 92.386 or 92.407.

92.410 COMPUTERS AND CALCULATORS IN THE CLASSROOM

This course explores the roles of mainframes, PC's 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. 3 credit(s).

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. 3 credit(s). Prerequisite: 92.226 or 92.231.

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. 3 credit(s). Prerequisite: 92.411.

92.413 NUMBER THEORY

Studies congruencies and the Chinese Remainder Theorem, Primitive roots, quadratic reciprocity, approximation properties of continued fractions, Pell's equa-

tion. Recent application of number theory such as primality testing, cryptology, and random number generation will also be covered. 3 credit(s). Prerequisite: 92.221 or 92.321.

92.414 PATTERN RECOGNITION/NEURAL NETWORKS I

Random vectors: Transformations of Random Vectors. Hypothesis Testing: Error Probability; Sequential Tests. Supervised Learning. Nearest Neighbor and Parzen Kernel Approach; Feature Extraction. 3 credit(s). Prerequisite: Calculus, Probability, Matrix Algebra.

92.417 TOPICS IN PATTERN RECOGNITION AND NEURAL NETWORKS II

Continuation of Neural Networks I. 3 credit(s). Prerequisite: 92.416.

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. 3 credit(s). Prerequisite: Two semesters of calculus and one semester of programming.

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. 3 credit(s). Prerequisite: 92.221 or 92.321.

92.421 ABSTRACT ALGEBRA I

Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homorphisms, applications. 3 credit(s). Prerequisite: 92.221 or 92.321.

92.422 ABSTRACT ALGEBRA II

Discusses elementary rings and field theory, quotient rings and ideals, homomorphism of rings, rings of polynomials, algebraic extensions, automorphisms of fields, separable extensions, and the Galois Theory. 3 credit(s). Prerequisite: 92.421.

92.427 GEOMETRY

A wide survey of topics related to secondary school geometry; axiomatic systems and Euclidean geometry; constructions in geometry; analytic geometry; introduction to Noneuclidean geometry. 3 credit(s). Prerequisite: 92.221 or 92.321.

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 contempo-

rary perspectives. 3 credit(s). Prerequisite: Three semesters of calculus.

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. 3 credit(s). Prerequisite: 92.234/221.

92.450 MATHEMATICAL MODELING

Devoted to studying the application of mathematics in government and industry. It includes numerous case studies which employ the techniques of graphical, optimization, and dynamic modeling. 3 credit(s). Prerequisite: 92.234.

92.451 FUZZY C++ NEURAL NETWORKS APPLICATIONS

This course covers implementation of neural networks and fuzzy logic applied to large data set analysis, pattern recognition, optimization, and financial modeling. Numerous examples and exercises are provided in C and C++ for use with most C/C++ compilers. Real-life applications are developed and students can apply what is learned to their specific work area. Course topics include neural network theory, metric spaces, fuzzy logic, neural network models (including Backpropagation, BAM, FAM, ART, etc.) and computer learning. 3 credit(s).

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. 3 credit(s). Prerequisite: 92.362.

92.455 ASSEMBLY LANGUAGE PROGRAMMING I

Presents absolute machine language coding and the symbolic programming language. The coding of practice problems on a high-speed digital computer using the basic computer instructions including arithmetic, input-out, logic, control operations and data manipulation will be covered. 3 credit(s). Prerequisite: 90.267.

92.457 ADA

Introduces the syntax and semantics of the programming language ADA, including data structures and types, control structures, tasks, packages and generics. Practical exercises involving the language will be included. 3 credit(s). Prerequisite: 90.267.

92.460 ATM NETWORKING

This course provides a comprehensive understanding of the advanced network technologies such as Fast Ethernet, 100VG-ANYLAN, Broadband ISDN, and especially, Asynchronous Transfer Mode. It begins with the discussion of the protocols, cabling, and standards for Fast Ethernet and 100VG-ANYLAN. The main topic of this course is the ATM technology. It explains what is BISDN, what is ATM, and how ATM works. The

BISDN/ATM Reference Model, protocols and functions in Physical, ATM, and ATM Adaptation layers will be presented. Special areas such as standards, traffic management, signaling, ATM switch architecture, SONET, LAN emulation, IP over ATM, and applications will be extensively discussed. 3 credit(s). Prerequisite: 92.471 or 92.472 or 92.473.

92.461 SYSTEMS SIMULATION AND MODELING

Presents procedures in model construction and computerized simulation, modeling tools and techniques, model conceptualization and implementation, and selected applications of simulation. 3 credit(s). Prerequisite: 90.267, 92.183.

92.462 SYSTEMS PROGRAMMING

Addresses basic concepts of assembly programs and compilers, macro generators, utility programs, supervisions, monitors, and high-level languages. 3 credit(s). Prerequisite: 90.360.

92.463 SYSTEMS DESIGN AND DEVELOPMENT I

Presents a general study of the design and development of computer-oriented data processing systems including: the approach requirements of the system, developing the solution, data controls, system controls, system evaluation, and reporting to management. 3 credit(s).

92.464 SYSTEMS DESIGN AND DEVELOPMENT II

Serves as a continuation of 92.463. Topics include: finalizing and implementing the system, post-installation evaluation, interdepartmental coordination, and case studies. 3 credit(s). Prerequisite: 92.463.

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.a 3 credit(s). Prerequisite: 92.386 or equivalent.

92.467 ASSEMBLY LANGUAGE PROGRAMMING II

Serves as a continuation of 92.455. Symbolic programming using advanced techniques including macro instructions, indirect addressing, file generation and processing, magnetic tape and magnetic disc applications are presented. 3 credit(s). Prerequisite: 92.455.

92.475 SENIOR SEMINAR I

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. Seniors only. 3 credit(s).

92.476 SENIOR SEMINAR II

An optional second semester seminar to allow for con-tinuation of study initiated in Senior Seminar I. Prerequisite: 92.475. 3 credit(s).

92.480 APPLIED COMBINATORICS

Presents generating functions, recurrence relations, inclusion-exclusion, Polya theory, experimental designs (block design), partially ordered sets, and applications. 3 credit(s). Prerequisite: Calculus and Discrete Structures.

92.483 APPLIED STATISTICAL METHODS

The development of statistical techniques without the use of calculus. Analysis of variance, multiple and curvilinear regression, and nonparametric methods. Prerequisite: 92.386 or equivalent. 3 credit(s).

92.485 QUEUING THEORY

Single-server queuing systems, queue length, and waiting time. Multi-server queuing systems. Modeling of telephone systems, interactive computer systems. 3 credit(s). Prerequisite: 92.307 or 92.386.

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. 3 credit(s). Prerequisite: 92.386 or equivalent

92.498 MATHEMATICS SEMINAR

Allows for student reading, writing and criticism of topics from current literature. Review of some important elements of undergraduate work. 3 credit(s). Prerequisite: Permission of coordinator.

DIRECTED STUDIES

Directed studies courses are available only to Mathematics majors and may be elected provided that 1) material to be covered is not available in any other mathematics course, 2) instructors are willing to undertake a directed studies, and 3) no more than nine credits in mathematics are taken in directed studies courses.

92.490 DIRECTED STUDIES IN COMPUTER MATHEMATICS

Individual study for the student desiring more advanced or more specialized work relating to the computer. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite: Permission of Department Coordinator. 3 credit(s).

92.491 DIRECTED STUDIES 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: Prerequisite: Permission of Department Coordinator. 3 credit(s).

92.492 DIRECTED STUDIES 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: Prerequisite: Permission of Department Coordinator. 3 credit(s).

92.493 DIRECTED STUDIES IN GEOMETRY

Individual study for the student desiring more advanced or more specialized work in geometry. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite: Prerequisite: permission of Department Coordinator. 3 credit(s).

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. 3 credit(s). Prerequisite: Requires Graduate Coordinator permission.

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. 3 credit(s). Prerequisite: 91.250 or equivalent; requires Graduate Coordinator permission.

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. 3 credit(s). Prerequisite: 91.305, 91.250 or equivalent; requires Graduate Coordinator permission.

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 techniques learned in this course and in previous courses to solve a number of logically complex programming problems. 3 credit(s). Prerequisite: 91.201, 92.322;

requires Graduate Coordinator permission.

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 oscillation, waves and sounds. Although the course emphasizes conceptual understanding, a functional knowledge of algebra and geometry is essential. 3 credit(s). Corequisite: 96.103. Offered in summer only. SCLO

95.104 GENERAL PHYSICS II

Provides a continuation of 95.103. Topics include electricity and magnetism, geometrical and physical optics, atoms, and nuclei. 3 credit(s). Prerequisite: 95.103. Corequisite: 96.104. Offered in summer only. SL

95.121 EXPLORING THE UNIVERSE

Addresses topics that include: Planet Earth, its structure, plate tectonics, greenhouse effect, ozone layer, craters and dinosaurs; our satellite Moon;other planets; our star Sun and its energy source; other stars, the HR diagram and stellar evolution, white dwarfs, neutron stars, supernovae, black holes; our galaxy, the Milky Way, its structure; other galaxies; the universe, its structures and expansion; evolution of galaxies, quasars, cosmology, the Big Bang and Unification of the forces of nature. 3 credit(s). Corequisite: 96.121. SCL

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. 3 credit(s). 4 contact hours. Corequisites: 92.131, 96.141. Offered in summer only. SCL

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. 3 credit(s). Prerequisite: 95.141. Corequisites: 92.132, 96.144. Offered in summer only. SL

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. 1 credit(s). 2 contact hours. Corequisite: 95.103 or 95.201. Offered in summer only. SCLO

96.104 GENERAL PHYSICS II LAB

Serves as a continuation of 96.103 with topics correlated with the corequisite lecture course. 1 credit(s). 2 contact hours. Prerequisite: 96.103. Corequisite: 95.104 or 95.202. Offered in summer only. SL

96.121 EXPLORING THE UNIVERSE LABORATORY

Provides laboratory exercises to illustrate the basic principles and measurement techniques of astronomy. Quantitative techniques, properties of angles, modeling the earth-sun system, comparative planetology, the constellations, the inverse square law, blackbody radiation and spectra, the Hertzsprung-Russell diagram, distances to the stars, the Andromeda galaxy, cosmology. 1 credit(s). Corequisite: 95.121. SL

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. 1 credit(s). 2 contact hours. Corequisite: 95.141. SCL

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. 1 credit(s). 2 contact hours. Prerequisite: 96.141. Corequisite: 95.144. SL

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. 3 credit(s). Corequisite: 99.102. SCLO

99.102 RADIATION AND LIFE LABORATORY

Provides 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 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. Suitable for non-science majors. 1 credit(s). Prerequisite or corequisite: 99.101. SCLO

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. 3 credit(s). 3.5 contact hours. Corequisite: 92.125. SL

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. 3 credit(s). 3.5 contact hours. Prerequisite: 99.131. SL

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. 3 credit(s). 3.5 contact hours. Prerequisite: 99.132. Corequisite: 92.126. SL

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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 (4.0), A- (3.7), B+ (3.3), B (3.0), B- (2.7), C+ (2.3), C (2.0) and F (0.0).

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 which 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 which 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 for an emergency or medical nature.

Y   Designates administrative withdrawal for other than academic reasons.

policies & procedures

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.

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 which 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 which has necessitated administrative dismissal can be ameliorated to the satisfaction of Continuing Studies. Examples of some conditions which 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 by filing a Withdrawal Form in Enrollment Services/Continuing Studies and Corporate Education.

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 Enrollment Services/Continuing Studies and Corporate Education. 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 Continuing Studies immediately and in writing.

INCOMPLETE COURSES

The letter symbol "INC" (incomplete) is a temporary notation which 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 been absent from the final course evaluation. 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 Enrollment Services/Continuing Studies and Corporate Education. A student who has evidenced an unsatisfactory course record, who has failed to complete a major portion of an instructor's course require-ments, or who has failed to provide an instructor with a satisfactory reason for absence from a final examination or final course evalua-tion 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 in sufficient time to permit an instructor to file a final course grade no later than one month after the date on which the succeeding semester begins. Whenever possible, the student and instructor should sign the permission for an Incomplete Form.

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), Continuing Studies 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 which 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 which 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 semes-ter 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, the maxi-mum period for which an extension may be granted is the last scheduled class day of the semester following the assignment of "INC" notations.

GRADE REPORTS AND TRANSCRIPTS

Grade reports are no longer mailed to 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 also request official transcripts using the ISIS sys-tem.

The University of Massachusetts Lowell will create and maintain a permanent record (transcript) showing complete course and grade-earned information for any student, matriculated or non-matriculated, who takes a course for credit. This record may not be modified or selectively deleted for any reason including the student's lack of awareness of the drop and withdrawal deadlines cited in our semester bulletins.

GRADE CHANGES

At the end of each semester, Enrollment Services/Continuing Studies and Corporate Education mails a grade report to each student. This report constitutes official notification of grades received. 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 erroneous 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 pos-sible 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 Enrollment Services/Continuing Studies and Corporate 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 CD 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 which are subsequently deleted/repeated.

When students register for courses which they wish to repeat, they must notify Continuing Studies at the time of registration.

REPETITION OF PASSED COURSES

Except for courses of a professional nature which regulations of a college may designate as being non-repeatable, students may repeat a course previously passed with a grade of CD 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 which 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 Director of Enrollment Management and Administration. 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 which 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 which 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.

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, 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 which have been specified.

Make-up examinations irrespective of make-up final examinations administered on specific dates by Continuing Studies 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 take advantage of the early registration policies as scheduled in each semester bulletin of class listings. In the event that a course is cancelled, Continuing Studies will try to notify preregistered students. Students may elect to enroll in another course or may request a full refund.

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.

Students Rights and Responsibilities

This section outlines student responsibilities and pertinent state and federal laws which 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 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 which 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 Program Coordinators.

STUDENT STATUS COMMITTEE

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

ACADEMIC DISHONESTY

DEFINITIONS OF ACADEMIC DISHONESTY

Students in the Division of Continuing Studies are expected to be honest and to respect ethical standards in meeting academic assignments and requirements. A student who cheats on an examination or assignment is subject to administrative dismissal.

The following definitions are provided for the information of all students and constitute official notice of prohibited academic practice and behavior.

1. Cheating is defined as 1) misrepresenting academic work done by another as one's own efforts, whether such misrepresentation has been accomplished with or without the permission of the other individual; 2) providing or utilizing prohibited assistance (whether in the nature of a person or a resource) in the performance of assignments and examinations; 3) copying of another person's work or the giving or receiving of information or answers by any means of communication during an examination; 4) utilization of the services of a commercial term paper company; and 5) the unauthorized or fraudulent acquisition and/or use of another's academic property.

2. Plagiarism is defined as 1) direct quotation or word-for-word copying of all or part of the work of another without identification or acknowledgment of the quoted work; 2) extensive use of acknowledged quotation from the work of others which is joined together by a few words or lines of one's own text; and 3) an abbreviated restatement of someone else's analysis or conclusion, however skillfully paraphrased, without acknowledgment that another person's text has been the basis for the recapitulation.

OBLIGATIONS OF FACULTY MEMBERS TO STUDENTS

Although each student is responsible for complying with prohibited practice and behavior, as defined above, faculty members are

responsible for publishing their special requirements for completing assignments and taking examinations. Such requirements must be made explicit through the published statement of course requirements or through examination and assignment directions.

Preservation of the integrity of the academic process is an exercise of professional judgment and is both a faculty right and a faculty duty. The rendering of a professional judgment when charging or adjudicating an academic offense must be honest and equitable and must ensure due process, including notification to the student of the particulars of a charge of academic dishonesty and the penalties that will be imposed or recommended.

In assessing penalties for academic dishonesty or prohibited academic practice and behavior, faculty members and designated authorities of the appeal process should consider the nature of the offense, the question of premeditation, and any previous record of dishonesty or violation of prohibited practice and behavior. Neither the student nor the University can be served when the punishment is not proportionate to the offense.

PROCESS OF NOTIFICATION AND ADJUDICATION

Depending upon the circumstances of time and place when academic dishonesty has been detected and the severity of penalty which the faculty member* wishes to impose, notice to the student concerning alleged dishonesty and/or violation of prohibited academic practice and behavior may be provided through either a formal or an informal procedure. Should the faculty member* fail to notify the student of a charge of academic dishonesty and/or prohibited academic practice and behavior through either an informal verbal notification of charges or a formal written notification of charges, no penalty may be imposed.

*When a faculty or department committee is responsible for evaluating student work for a course (e.g., Senior Studio Review Committee, Department of Art), instructor notification will be provided by the committee chairperson.

INFORMAL PROCEDURES

The informal notification procedure may be used only in the following instances: 1) in cases of observed cheating or observed violation of testing or classroom assignment requirements; 2) in cases of reported cheating or violation of classroom testing or assignments, detected plagiarism, or other cases occurring prior to the final examination in which the acts of academic dishonesty and their detection are not coincident; and 3) in cases for which the recommended penalty, per se, is less than course failure.

The informal notification procedure may not be used for offenses that are detected during or after the administration of the final course examinations or (in the event that no final examination is administered) after the last class of a semester and may not be used if the faculty member wishes to impose penalties that range in severity from course failure to suspension from the University.

In cases of observed cheating, the informal procedure includes verbal notification to the student prior to the end of the examination or class period and appropriate written comment on the student paper that includes a statement of the penalty to be imposed. In those cases wherein the act of academic dishonesty and its detection are not coincident, the faculty member will provide notification by making an appropriate written comment on the paper or assignment that includes a statement of the penalty to be imposed. Within three class days of notification, the student may request a meeting to discuss the charge and the penalty specified, and the faculty member will schedule the meeting. The purpose of this informal meeting is to clarify possible misunderstandings between the student and the faculty member, to discuss the impact of the proposed penalty upon the student's final grade, and to pursue any question relative to the charges and penalties. At this meeting, or within three class days of this meeting, the student must advise the faculty member that he or she accepts the charge and penalty proposed or that he or she will initiate a formal appeal with the department chairperson. If the student does not initiate a formal appeal, the charge may not be challenged and the penalty may not be appealed. In the event that a formal charge of academic dishonesty is initiated by a department chairperson, the chairperson shall be replaced in all stages of the appeals procedure by a senior faculty member of the department in which the violation is alleged to have occurred.*

*In the event that all members of the department are also members of the department committee that initiated charges against a student and the chairperson of the department committee also is the chairperson of the department, the appeal process must begin with the college dean.

FORMAL PROCEDURES

The formal procedure for notification and adjudication must be used in the following instances:

1. In cases of observed cheating or violation of testing procedures during the final examination;
2. In cases of cheating or plagiarism that are detected after the final examination; and
3. In cases for which the recommended penalty ranges from course failure to expulsion.

In each of the above cases, the faculty member will provide the student with formal written charges of alleged dishonesty or of prohibited academic practice or behavior. During periods when classes are in session, such charges either will be given to the student in person or will be sent to the student's campus mailbox. During periods when classes are not in session, such charges will be sent to the student at his or her official home address of record by registered mail (return receipt requested).

Notification must be given to the student or mailed either within three class days* of the time when the faculty member became aware of the alleged student offense or by the last day for filing semester grades with Enrollment Services, whichever is earlier. A copy of written charges will be forwarded to the department chairperson, the chairperson of the college academic standards committee, and the college dean.*

*The term "class day" is defined as any day when classes and final examinations are scheduled. It also applies to days when University offices are open during the week that immediately precedes the first scheduled day of semester classes. In extraordinary circumstances, the college dean may authorize extensions of deadlines and may authorize scheduling of hearings during periods other than the regular academic year.

*The terms "department chairperson," "college dean," and "college academic standards committee" refer, respectively, to the designated officials and committee of the college in which the concerned course is offered.

A formal adjudication of a charge of academic dishonesty also may be initiated by a student on appeal from the procedure of informal adjudication and discussion. In such case, the faculty member must provide a formal written statement of charges to the student, the department chairperson, the chairperson of the college academic standards committee, and the college dean within two class days of the student's notification of intent to appeal.

Within seven class days of receipt of a formal notification of academic dishonesty, the department chairperson must hold a meeting with the faculty member and the student to discuss the charges and recommended penalty. At the end of the meeting, the department chairperson will notify the parties of his or her judgment. If there is no further appeal, the chairperson's decision is final.

Either the student or the faculty member may appeal the chairperson's decision to the college academic standards committee. This appeal must be made within three class days of the chairperson's decision. The academic standards committee will meet with the department chairperson, the faculty member, and the student within seven class days of receipt of a requested appeal. Within three class days, the academic standards committee must notify the concerned parties of their decision. If there is no further appeal, the committee's decision is final.

Either the student or the faculty member may appeal the decision of the college academic standards committee to the college dean. This appeal must be made within three class days of the committee's decision. The college dean will meet with the chairperson of the college academic standards committee, the department chairperson, the faculty member, and the student within seven class days of the requested appeal. Within three class days, the college dean must notify the concerned parties of his or her decision. The decision of the college dean is final and, hence, may not be appealed.

Right of Student Counsel at Hearings

A student who has been formally charged with an academic offense may request representation from the Office of Student Services, the counseling staff, or the full-time faculty to provide aid and assistance at any stage of formal hearings. Such counsel will be provided with copies of documents that have been forwarded to hearing authorities, and he or she must be present for all formal hearings. Legal counsel may also be present for either the student or the University but may not participate in hearing deliberations.

SPECIAL PROVISIONS

While an appeal process concerning an academic offense remains unresolved, the charge shall not prejudice the right of a student who has not otherwise been suspended for unsatisfactory academic performance or student misconduct from continuing his or her course of study at the University.

The timetables which have been specified above for the conduct of appeal processes have been developed to insure the speedy resolution of both the charges and the student's University status. In the event that resolution of a charge of academic dishonesty cannot be made prior to the beginning of the next semester and a charge of academic dishonesty is subsequently sustained and the penalty imposed either requires or results in suspension, the student shall be dropped from the University immediately and, accordingly, may not be permitted to complete courses for which he or she may have registered.

A party to an appeal hearing who is unable to attend his or her hearing as scheduled must notify the authority conducting the hearing as soon as possible, preferably one day in advance. An individual may be excused from attendance and may be granted a second hearing for good and sufficient reason acceptable to the appeal authority. Except for the penalties of suspension or expulsion from the University, which require the concurrence of the college dean, an appeal authority at any level may resolve a charge of academic dishonesty and/or may impose a penalty without recourse to subsequent hearings, if, without prior notice, the appealing party has failed to appear as scheduled for an appeal hearing.

A party appealing who is unable to provide advance notice of his or her inability to attend an appeal hearing as scheduled may submit an academic petition to the college dean requesting a rehearing before the appropriate authority. The college dean may grant a rehearing for reasons of serious illness, accident, critical personal or family emergency, or other acceptable reasons. His or her decision concerning a rehearing is final.

PENALTIES FOR ACADEMIC DISHONESTY OR PROHIBITED ACADEMIC PRACTICE AND BEHAVIOR

Except as noted below, penalties for academic dishonesty or prohibited academic practice and behavior that are adjudicated through the informal procedure are limited to 1) administering an alternative assignment or substitute examination, which is at the sole discretion of the faculty member; and 2) assigning a failing grade for the examination or assignment and denying the student permission to withdraw from the course if the offense in question occured before the fiftieth class day.

Penalties for academic dishonesty or prohibited academic practice and behavior, which are adjudicated through the formal procedure (including cases appealed by the student from an informal adjudication), may range from the administration of an alternate assignment or substitute examination, which is at the sole discretion of the faculty member, to assigning a failing grade for an examination or assignment (and consequently lowering the student's final course grade), to course failure (including denying the student permission to withdraw from the course in question before the fiftieth class day), to academic suspension, to dismissal from the University.

The penalty of academic suspension, which may be imposed for a new semester or academic year, and the penalty of dismissal from the University (expulsion), which is permanent, may be imposed only by the college dean. In the event that the dean of the college in which an academic offense has taken place approves or imposes either a penalty of academic suspension or dismissal (expulsion) from the University on a student who is matriculating for a degree in a college other than that in which the academic offense has taken place, such suspension or dismissal requires the concurrence of the dean of the college in which the student is matriculating. If the deans do not concur, they must arrive at a mutually agreeable penalty and their decision is final.

The semester grade filed by a faculty member for a student who is the subject of an unresolved or pending allegation of academic dishonesty shall be an Incomplete, with an end-of-course letter grade to be assigned in the event that the student makes no appeal or the charge is sustained through appeal and the penalty is reaffirmed. If the determination of penalty made at the last step of the appeal process, as invoked, is different from that which was initially made, the faculty member must file a correction of the final grade which is in compliance with the final determination.

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 to Enrollment Services/Continuing Studies and Corporate Education.

Complaints Concerning Classroom Matters Exclusive of Grades and Grading Policy

Students confronting classroom problems which 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 either to the Student Status Committee or directly to the Director of Enrollment Management and Administration. After discussing the problem with the student and the faculty member, the complaint will be forwarded to the Faculty Coordinator or Chairperson of the discipline in question. The student will later be informed of the Coordinator and/or Chairperson's decision.

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 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 the Registrar's Office. Within ten 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 which 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 goverments or in connection with the enforcement of legal requirements which 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 Affirmative Action Officer, 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.

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."

POLICY CHANGES

Although the Division of Continuing Studies, University of Massachusetts Lowell 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 scheduled night 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, and standards, degree requirements, and 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.

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 Affirmative Action Officer, 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.

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/studentservices/dean/CampusCrimeReport.html#Statistics. 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://www.uml.edu/student-services/.

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 Continuing Studies. For more information on applying into a degree program, see page 21. See page 65 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. You 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 Registration Information page. Before the semester begins go to the UMass Lowell online course website at http://continuinged.uml.edu/online and complete the Registration Confirmation process. Check the site periodically to determine availability of the Registration Confirmation process. It is usually available two weeks before the start of each semester. At this time, 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 and insurance, please contact Harriet Rocheleau at (978) 934-3584 or at Harriet_Rocheleau@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 12-14, or call the Financial Aid Office at (978) 934-4220 for assistance. Ask them for information about TERI and PLATO loans for Continuing Studies students.

Q. What is the refund policy?

A Students withdrawing from any class must officially notify the Registrar's Office/Continuing Studies and Corporate Education using the ISIS online registration system. To withdraw from a class follow the registration procedure outline 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 CSCE 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 16 for more information.

Q. How do I get a student ID and parking sticker?

A. Non-matriculated students who register by phone or mail will receive their ID by return mail. Students matriculated in a degree or certificate program have been/or will be issued access cards. 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. 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 Escort 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/escort.html

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 and Corporate 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/disab/.

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 181 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.

ALPHABETICAL LISTING OF COURSES

University of Massachusetts Lowell
Admissions/ Continuing Studies and Corporate Education
Dugan Hall, Room 110
883 Broadway Street
Lowell, MA 01854-5104

UMASS

Degree Program Application for Admission

Please Note: Return completed application form along with the $20 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   *Please print your intended major here:*

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 $20 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.

Updated 03/27/06

University of Massachusetts Lowell
Admissions/Continuing Studies and Corporate Education
Dugan Hall, Room 110
883 Broadway Street
Lowell, MA 01854-5104

Certificate Program Application for Admission

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			
(check one)	☐ Computer Assisted Manufacturing	☐ Information Technology	☐ Security Management & Homeland Security
	☐ Computer Engineering Technology	☐ Land Surveying	☐ Spanish and Latin American
	☐ 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.

The University of Massachusetts Lowell is an Equal Opportunity/Affirmative Action, Title IX, H/V, ADA 1990 University and does not discriminate on the basis of race, color, sex, age, religion, national origin, sexual orientation, disability or veteran status in its educational programs, activities, or employment policies.

Updated 3/27/06

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at a glance

UMass Lowell Continuing Studies
Academic Calendar 2005-2006

The following is a general academic calendar. Visit our website at http://continuinged.uml.edu/ for the most up-to-date information.

FALL SEMESTER 2005
September 6-December 22, 2005

WINTER INTERSESSION 2006
January 3-January 19, 2006

SPRING SEMESTER 2006
January 24-May 19, 2006

SUMMER SESSION I 2006
May 22-June 30

SUMMER SESSION II 2006
July 10-August 18

FALL SEMESTER 2006
Dates to come

DIRECTORY

IMPORTANT PHONE NUMBERS

Continuing Studies Main Number	(978) 934-2480
Continuing Studies Fax Number	(978) 934-3087
Continuing Studies Advising Center	(978) 934-2474
Enrollment Services/Continuing Studies	(978) 934-2588
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
Phone-In Registration - Operator Assisted	(978) 934-2700
UMass Lowell Main Number	(978) 934-4000
Weather Cancellations	(978) 934-2121
UMass Lowell Career Services	(978) 934-2355
UMass Bookstore - UMass Lowell North	(978) 934-2623
UMass Bookstore - UMass Lowell South	(978) 934-6908

CONTINUING STUDIES ADMINISTRATION

Dr. Jacqueline F. Moloney, Dean

Catherine A. Kendrick, Director of Corporate & Distance Market Development

Pauline Carroll, Director of Enrollment Management & Administration

CONTINUING STUDIES STAFF

Johanna Bohan-Riley, Assistant Director of Enrollment & Technical Services
Kim Downey, Advertising and Design Coordinator
Patrick Driscoll, Technical Services Manager
Judith Feeney, UNIX/Web Services Coordinator
Jacqueline Hawk, Corporate Outreach Coordinator
Carrie Powanda-Croft, Faculty Developer
Albert Sacco, Technical Services Coordinator
Kathleen Shannon, Administrative Specialist
Carolyn Siccama, Distance Faculty Developer
Nancy Sireen, Financial Manager
Gwen Smith, Administrative Assistant
Joanne Talty, Corporate Project Manager
Steven Tello, Associate Director of Distance Learning
Elizabeth Wesson, Business Office
Alena Woods, Distance Learning Course Developer
Amy M. Yacus, Assistant Director of Marketing & Outreach
Weiping Zhen, Technical Services Coordinator

EVENING SUPERVISORS

Professor Alan Doerr
Professor Bernard Shapiro

FACULTY ADVISORS

Associate Professor Paul Damour: Biology, Chemistry, Environmental Science, Physics
Michael Berry: Civil Engineering Technology
Professor Joseph Lipchitz: Criminal Justice, Paralegal Studies
Professor Richard Siegel: Liberal Arts, Psychology
Professor Fahd Wakim: Electronic Engineering Technology
Professor Ann Marie Hurley: Information Technology
Professor Alan Doerr: Mathematics
Assistant Professor Glenn Sundberg: Mechanical Engineering Technology
Professor Robert Tuholski: Department Head, Mechanical Engineering Technology
Professor Stephen Driscoll: Plastics Engineering Technology

GENERAL FACULTY AND STUDENT SUPPORT SPECIALISTS

Ms. Susan Wartman: Degree & Certificate Programs
Ms. Brenda Woonton: Degree & Certificate Programs

OFFICE LOCATIONS

Continuing Studies Administration	Southwick 303
Enrollment Services/Continuing Studies	Dugan 104
Continuing Studies Faculty and Student Support Center	Southwick 202
Campus Police	Ball 125
College of Arts and Sciences	Olney 524 (North)
	Durgin 104 (South)
College of Education	Upham 101
College of Engineering	Kitson 311
College of Health Professions	Weed 103
College of Management	Pasteur 305
Financial Aid	Dugan 102
Graduate School	Dugan Hall
Office of Career Services	Southwick 200
UMass Lowell Bookstores	
UMass Lowell North	Falmouth Hall Basement
UMass Lowell South	South Dining Hall

PARKING INFORMATION

New parking stickers are required for all Continuing Studies students. The Parking 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.

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.

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.

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