Announcement of General Information and Courses in the Colleges of

Architecture and Design,

Arts and Sciences,

Engineering,

and Management

For the Academic Years 2001-2003
VISIT THE CAMPUS

Lawrence Technological University welcomes prospective students, family members, employers, and others to visit. While on campus, prospective students are encouraged to discuss their educational plans with admissions staff and to meet current Lawrence Tech students, professors, or deans. Call the Admissions Office toll free at 1-800-CALL-LTU (225-5588) to arrange an appointment or to request additional information. The Admissions Office is open (except holidays) Monday-Thursday 8 a.m.–8 p.m., and Friday 8 a.m.–4:30 p.m. If you plan to visit during the summer, please contact the Admissions Office for summer hours.

ON THE COVER

Lawrence Tech’s dramatic new $20 million Technology and Learning Center provides 85,000 sq. ft. of high tech laboratory, classroom, and studio space, and was designed by celebrated New York architect Charles Gwathmey. It opens for student use in Fall 2001. The University’s 115-acre full-service campus provides a full range of academic, recreational, and residential facilities, along with convenient access to major freeways. Southeastern Michigan is one of America’s hubs of business and commerce, the site of some of the world’s outstanding technological accomplishments.

ABOUT THIS UNDERGRADUATE CATALOG

This Undergraduate Catalog is a compendium of learning opportunities available at Lawrence Technological University. It includes information on academic programs, requirements for admission and graduation, rules, regulations, and expectations. Failure to read this Undergraduate Catalog does not excuse students from the requirements and regulations described herein. While every effort is made to provide accurate and current information, the University reserves the right to change rules, policies, fees, curricula, courses, and other programs described to reflect faculty or administrative action. This Undergraduate Catalog is accurate as of the publication date. For information about graduate programs, refer to Lawrence Tech’s Graduate Catalog.

CONTACTING LAWRENCE TECH

The University’s mailing address is: 21000 West Ten Mile Road, Southfield, MI 48075-1058. The main switchboard phone number is 248-204-4000. Visit Lawrence Tech’s home page on the internet at www.ltu.edu

NOTICE OF NON-DISCRIMINATORY POLICY

Lawrence Technological University adheres and conforms to all federal, state, and local civil rights regulations, statutes and ordinances. No person, student, faculty or staff member will knowingly be discriminated against relative to the above statutes. LAWRENCE TECHNOLOGICAL UNIVERSITY IS AN EQUAL OPPORTUNITY EMPLOYER.

CAMPUS MAP

Building Key
1. Corporate Services Center
2. Don Ridler Field House; Applied Research Center
3. Engineering Building
4. Science Building
5. Wayne H. Buell Management Building
6. Architecture Building
7. University Technology and Learning Center
8. Presidents Conference Center
9. University Housing Center
10. Maintenance Building
11. Outdoor Athletic Fields
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2001-2003 Semester initial class dates indicated in bold.
### Academic Schedule 2000-2001

#### Fall Semester 2000
- **April 10-14**: Advance registration
- **April 15-August 31**: STUREG continues
- **August 29**: Last day to register without a late fee
- **August 30**: Classes begin; late registration
- **September 2**: Last day of classes before Labor Day recess
- **September 5**: Classes resume
- **November 22**: Last day to withdraw
- **December 16**: Last day of classes before final exams
- **December 22**: Fall semester ends

#### Spring Semester 2001
- **November 6-10**: Advance registration
- **November 7-January 16**: STUREG continues
- **January 12**: Last day to register without a late fee
- **January 15**: Classes begin; late registration
- **January 15***: Martin Luther King Day celebration
- **March 10**: Last day of classes before mid-semester break
- **March 12-17**: Mid-semester break
- **March 19**: Classes resume
- **April 13**: Last day to withdraw
- **May 5**: Last day of classes before final exams
- **May 7-10**: Final exams
- **May 20**: Graduation
- **May 21**: Spring semester ends

#### Summer Semester 2001
- **Session A**:  
  - **April 9-13**: Advance registration
  - **April 15-May 17**: STUREG continues
  - **May 15**: Last day to register without a late fee
  - **May 16**: Classes begin; late registration
  - **May 26**: Last day of classes before Memorial Day recess
  - **May 29**: Classes resume
  - **June 19**: Last day to withdraw
  - **June 27**: Semester ends

- **Session B**:  
  - **April 9-13**: Advance registration
  - **April 15-July 10**: STUREG continues
  - **July 6**: Last day to register without a late fee
  - **July 9**: Classes begin; late registration
  - **August 10**: Last day to withdraw
  - **August 18**: Semester ends

- **Session E**:  
  - **April 9-13**: Advance registration
  - **April 15-May 17**: STUREG continues
  - **May 15**: Last day to register without a late fee
  - **May 16**: Classes begin; late registration
  - **May 26**: Last day of classes before Memorial Day recess
  - **May 29**: Classes resume
  - **July 3**: Last day of classes before Independence Day recess
  - **July 5**: Classes resume
  - **July 11**: Last day to withdraw
  - **July 25**: Semester ends

Additional on-line registration dates are scheduled by the Registrar's Office. Watch for postings.

*To afford an opportunity to all members of the university community, students, faculty, and staff who may desire to participate in the celebration of Dr. Martin Luther King's life and legacy, upon request, may be excused from any scheduled classes, office hours, meetings, etc. from 11 a.m. to 1 p.m. Temporary help, substitute instruction, rescheduling, etc. will be provided as needed. During this period, all mandatory activities such as exams, presentations or other graded activities will be deferred, although assignments may be made by E-mail for subsequent sessions.*
Undergraduate Catalog 2001-2003

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### Academic Schedule 2001-2002

#### Fall Semester 2001
- **April 9-13**: Advance registration
- **April 14-August 30**: STUREG continues
- **August 28**: Last day to register without a late fee
- **August 29**: **Classes begin**; late registration
- **September 1**: Last day of classes before Labor Day recess
- **September 4**: Classes resume
- **November 20**: Last day to withdraw
- **November 21**: Last day of classes before Thanksgiving recess
- **November 26**: Classes resume
- **December 15**: Last day of classes before final exams
- **December 21**: Fall semester ends

#### Spring Semester 2002
- **November 5-9**: Advance registration
- **November 10-January 15**: STUREG continues
- **January 11**: Last day to register without a late fee
- **January 14**: **Classes begin**; late registration
- **January 14**: Martin Luther King Day celebration
- **March 9**: Last day of classes before mid-semester break
- **March 11-16**: Mid-semester break
- **March 18**: Classes resume
- **April 12**: Last day to withdraw
- **May 4**: Last day of classes before final exams
- **May 6-10**: Final exams
- **May 19**: Graduation
- **May 20**: Spring semester ends

#### Summer Semester 2002
- **Session A**:  
  - **April 8-12**: Advance registration
  - **April 15-May 16**: STUREG continues
  - **May 14**: Last day to register without a late fee
  - **May 15**: **Classes begin**; late registration
  - **May 25**: Last day of classes before Memorial Day recess
  - **May 28**: Classes resume
  - **June 12**: Last day to withdraw
  - **June 26**: Semester ends

- **Session B**:  
  - **April 8-12**: Advance registration
  - **April 15-July 5**: STUREG continues
  - **July 5**: Last day to register without a late fee
  - **July 8**: **Classes begin**; late registration
  - **August 9**: Last day to withdraw
  - **August 17**: Semester ends

- **Session E**:  
  - **April 8-12**: Advance registration
  - **April 15-May 16**: STUREG continues
  - **May 14**: Last day to register without a late fee
  - **May 15**: **Classes begin**; late registration
  - **May 25**: Last day of classes before Memorial Day recess
  - **May 28**: Classes resume
  - **July 3**: Last day of classes before Independence Day recess
  - **July 5**: Classes resume
  - **July 10**: Last day to withdraw
  - **July 25**: Semester ends

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Lawrence Technological University is an independent, co-educational accredited university founded in 1932 and offering more than 40 academic programs at the baccalaureate, graduate, and associate degree level. The University is composed of Colleges of Architecture and Design, Arts and Sciences, Engineering, and Management. Approximately 5,000 students are enrolled in full-time, part-time, day, evening, credit, and non-credit programs.

Lawrence Tech combines the benefits of a close, caring, small college atmosphere with the academic depth and scope of a larger university. Lawrence Tech takes a personal approach to education, and the University attracts students who generally have made some big plans for themselves. They're highly motivated students with a tremendous will to succeed, to excel, and to seek out the best in whatever they do.

Lawrence Tech has a reputation for excellence. Many students claim that the University’s programs are tough and challenging — programs that unapologetically demand commitment. At the same time, as a result of their educational preparation, Lawrence Tech graduates report (in numbers well above national norms) that they arrive in the workplace feeling prepared and ready to do their jobs.

Independent studies also confirm that Lawrence Tech students rapidly achieve placement success. In recent years, some 97 percent of graduates responding report finding career positions within a year. The American Society of Employers ranks Lawrence Tech first in its class as a preferred provider of graduates to Southeastern Michigan employers. Standard & Poor's also ranks Lawrence Tech in the top third of all colleges and universities providing the leaders of America’s most successful businesses.

The heritage and educational philosophy of the University is reduced to just three words in the University motto, adopted shortly after Lawrence Tech was founded in 1932 — “theory and practice.” It means that Lawrence Tech seeks to explain not only why something should work, but how it works in real situations and applications.

Much of the student’s learning in this way will be gained directly from Lawrence Tech’s professors. Many Lawrence Tech faculty have years of successful industrial and professional experience in addition to academic credentials from some of the nation’s top universities and colleges. They’ve learned what succeeds in the “real” world, and they’ll try to make sure that students do, too.

In addition, there is unusually close interaction between the University and the professions that its students and graduates serve. Assuring that academic programs provide students with the types of contemporary skills that employers value is a special goal. Remarkably, some 60 percent of students in recent graduating classes report holding a full-time job while going to school. Clearly, this is a student body that knows about the world of work and demands value.

Another attribute is the University’s location in close proximity to some of the world’s leading industrial, technological, business and scientific enterprises. The relationship is more than geographic — it assures the University’s participation in
“cutting edge” advancements and “front office” accessibility by students interested in co-op, part-time, and networking opportunities. Over 200 Fortune 500 corporations have headquarters or major operations within a half-hour’s drive of Lawrence Tech’s campus.

Finally, Lawrence Tech students are strongly encouraged to interact with the professional world throughout their academic program. Dozens of professional societies are active on campus and help students network with men and women already working in specific fields. Many of the academic programs also require participation in professional projects that seek to solve real problems facing practicing architects, engineers, managers, scientists, and others. The projects offer tremendous exposure to some exciting challenges, and Lawrence Tech students regularly earn top awards in competitions that pit them against students from other top colleges and universities throughout the hemisphere.

There is an intangible “spirit” at Lawrence Tech — an earnest spirit of student and faculty enthusiasm for learning and living, and a spirit of motivation and desire to excel. It’s not confined to the classroom or the laboratory; it’s an all encompassing feeling — both a reality and an ideal.

Consider Lawrence Tech. Share the spirit!

**MISSION AND PURPOSE**

Lawrence Technological University was founded as an independent non-profit institution of higher learning. The Lawrence Technological University mission is to provide superior undergraduate, graduate, and lifelong learning for professional achievement and civic excellence. Toward that end, the following purposes have been established:

1. To maintain programs at a high level of contemporary theory and practice using leading-edge learning technology, student projects, and distinctive treatment of general education.
2. To offer high quality education in the form of accessible, convenient, technology-based, personal and small class instruction.
3. To offer a core/foundation liberal arts education designed to cultivate students’ ability to think critically, to solve problems creatively, and to make decisions that will benefit themselves and society.
4. To respond to and serve industry, the professions and the community by providing quality innovative programs and continuing professional development.

Lawrence Technological University’s vision is to be the school of first choice in the region for technology-based professional education and be recognized as a partner to industry, business, and government in Southeastern Michigan.

**ACCREDITATION AND MEMBERSHIPS**

Lawrence Technological University is accredited by The Higher Learning Commission and a member of the North Central Association of Colleges and Schools, 30 N. LaSalle St., Suite 2400, Chicago, IL 60602-2504; (800) 621-7440. The NCA accreditation report is on file in the University’s library and is available for public review by patrons. Various graduate and undergraduate degree programs in architecture, interior architecture, imaging, business administration and management, chemistry, and engineering are additionally accredited through appropriate national professional agencies.

Lawrence Tech’s institutional memberships include the American Society for Engineering Education, the Association of Collegiate Schools of Architecture, the Association of Collegiate Business Schools and Programs, and the Association of American Colleges and Universities. The University is also a member of the American Council on Education; the College Board; Association of Governing Boards of Universities and Colleges; International Assembly for Collegiate Business Education; Association of Independent Colleges and Universities of Michigan; National Association of Independent Colleges and Universities; Council for Higher Education.
Accreditation; The Council of Graduate Schools; ESD, the Engineering Society; National Financial Aid Association; Michigan Student Financial Aid Administrators; Midwest Association of Student Financial Aid Administrators; and the National Association of Student Financial Aid Administrators. In addition, the University has membership in the Michigan and American Associations of Collegiate Registrars and Admissions Officers; Southfield, Greater Detroit, and U.S. Chambers of Commerce; Michigan, Ohio, and National Associations of College Admissions Counselors; American Association of University Administrators; Association of College Administration Professionals; National Collegiate Athletic Association; Advanced Acceptance Program; and the Michigan and National Associations for Foreign Student Affairs.

Faculty and staff are often members of a wide variety of national professional organizations appropriate to their disciplines. Professional organizations with active student chapters at Lawrence Tech are listed in the Student Life section of this Catalog.

DAY, EVENING AND WEEKEND CONVENIENCE

Lawrence Tech’s bachelor’s classes are offered in both day and evening schedules which complement each other. Lawrence Tech is one of only a few universities to offer a complete selection of associate, bachelor’s and master’s degree programs in the evening. The University pioneered the offering of then-novel evening degree programs in 1932.

Evening associate programs are offered in four engineering technologies.

Both graduate and undergraduate classes are offered on a semester calendar — two semesters of 16 weeks. The Fall Semester begins in late August and ends in mid-December. The Spring Semester begins in January and ends in mid-May. There are also short and long summer sessions which offer students the opportunity to accelerate and continue academic progress or make up deficiencies.

Graduate programs are designed for working professionals. All are offered in the evenings and several are also available on weekends.

CLASSES AND FACULTY

Lawrence Tech’s moderate size encourages close interaction between students, faculty, and staff. Classes are generally small, especially for upper-classmen, and individual initiative is stressed.

Lawrence Tech has about 300 full and part-time faculty. Exemplifying the University motto of “theory and practice,” in addition to academic experience, many also bring a wealth of personal “real world” research, business, or industrial experience to the classroom or laboratory. In addition to courses taught by Lawrence Tech’s full-time professional faculty, it isn’t unusual, for example, for students in appropriate disciplines to take classes taught by adjunct faculty who are successful corporate executives, practicing accountants, managers, entrepreneurs, engineers, architects, attorneys, and scientists. Such exposure is deliberate on the part of the University, and seeks to help students develop an awareness of “real world” problem solving applications of their academic studies.

Lawrence Tech students find their professors are normally easily accessible, and that they are eager to discuss individual questions, academic progress, or concerns outside of class. The University has a tradition of maintaining an “open door” policy with faculty, department chairpersons, deans, the president, and other administrative staff.
DIRECT STUDENT INTERACTION

The successful Lawrence Tech student generally arrives on campus with a full measure of ability and self-initiative. Self-initiative is Lawrence Tech's term for a proper combination of motivation and self reliance. These students appreciate the institutional position that the University exists for, and interacts with, the student— not relatives, spouses, or friends wishing to represent them. The fact that Lawrence Tech students are of a maturity that requires no such representation helps ensure that they are prepared for responsible full or part-time employment during their academic career and, following graduation, for professional employment or continued study.

CONTINUING EDUCATION AND PROFESSIONAL DEVELOPMENT

Continuing Education and Professional Development are vital components in career development and are reflected in today's critical need to prepare for the future. Lawrence Tech's Division of Continuing Education and Professional Development assists organizations and individuals in maintaining their competitive edge in today's marketplace by increasing skills, knowledge, and productivity, be they focused on technical, production, managerial, administrative, or executive issues.

Lawrence Tech offers many non-degree special academic opportunities. Services range from one-time on-site training sessions to customized development of entire training curricula. The Division utilizes a range of resources calling upon the extensive skills and talents of a variety of consultants, instructors, curriculum designers, trainers, and educational developers, whose services are complemented by a support staff which works closely with every client.

Working with the Colleges of the University, the Division designs, develops, and delivers non-degree credit programs in six major areas which include: engineering, management, architecture, computers, communication skills, and insurance studies. Other services include:

- Public programs in the form of seminars, workshops, conferences, and symposia which serve the professional development needs of alumni and the University's constituent audiences;
- Employee development and training programs which are typically offered off-campus to business, industry, government, and professional associations;
- On-campus meeting services office which welcomes hundreds of visitors to campus each year for corporate, business, and professional association meetings.

For further information on professional development programs and/or related meeting services, contact the director of the Division at (248) 204-4050.
In recent years, Lawrence Technological University’s park-like 115-acre campus has expanded so that it includes nine major buildings. An exciting program of improvements is underway in all academic buildings and a $20 million University Technology and Learning Center will open in the Spring of 2001.

Located near the exact center of population of southeastern Michigan, the University is conveniently situated in the Oakland County city of Southfield, a community of approximately 75,000 people. For visitors travelling by car, the campus is about 30 minutes northwest of downtown Detroit. It is also about 30 minutes northeast of Detroit Metropolitan Airport.

Lawrence Tech is easily accessible through the interstate highway system and is located at the intersection of West Ten Mile Road and Northwestern Highway (M-10, the Lodge Freeway), just south of Interstate 696.

Lawrence Tech’s location is considered by many to be one of the University’s greatest assets, particularly taking into account the wealth of nearby opportunities for students to network with practicing professionals, participate in career related organizations, and find full- and part-time employment during college and after graduation.

The campus is at the center of the world of real work, real problems to be solved, and real possibilities for a full professional and cultural life. Southeastern Michigan is a hub of American business and industry. It is a manufacturing and corporate center, the site of some of the world’s outstanding technological accomplishments, and a focal point for cultural activities and recreation.

Within a 15 mile radius of campus are world headquarters for many of the nation’s leading research, industrial, and manufacturing firms. More than 200 Fortune 500 companies are headquartered or have major operations here. And while the area’s economy is substantially more diverse than the days when the region was dubbed the world’s auto capital, fully one third of all U.S. auto production still takes place within 70 miles of the campus — generally in some of the planet’s most sophisticated, highly automated, and innovatively managed work environments.

Lawrence Tech is the designated Small Business Development Center for Oakland County, with specialization in technology.

Oakland County ranks as the second wealthiest county in the nation among counties with populations in excess of one million. Retail sales in the county exceed those of 17 individual states. The county is a leading center of international commercial activity and home to 425 foreign-owned firms from 22 countries. About 35 percent of Michigan’s R&D firms are here, and more than 50 percent of the nation’s automotive supplier technical centers. Robotics firms in the county account for more than half of U.S. robotic sales.

Nearby recreational opportunities abound — over 450 lakes, five ski areas, nearly 30 public fishing sites, and more golf holes per capita than any place else in the country. Major entertainment facilities within a half hour drive include Pine Knob and Meadowbrook outdoor music theaters, the Pontiac Silverdome (home of the NFL Lions), the Palace of Auburn Hills (home of the NBA Pistons), Joe Louis Arena (home of the NHL Red Wings), and Comerica Park (home of the Detroit Tigers). Additional attractions include Cranbrook Museums, the Detroit Zoo, the Detroit Institute of Arts, Historical Museum, Motown Museum, Henry Ford Museum and Greenfield Village, Museum of African American History, and more.

Lawrence Tech’s University Housing Center was completed in 1977. The nine-story building offers students 142 furnished, air-conditioned apartment units accommodating up to 400 students. See the Student Housing section of this Catalog for additional information.

The Engineering Building was the first building on the Southfield campus, being completed in 1955. It was most recently enlarged in 1987. The building houses offices for Veteran’s Affairs, College of Engineering, and Personnel Services. A student Service Center offers “one stop shopping” for students needing assistance from Business Services/Cashier, the Registrar, or Financial Aid Offices. In addition, the structure houses classrooms and...
laboratories. This building is being substantially improved as part of the University Technology and Learning Center.

The Science Building, opened in 1967, has been extensively renovated and equipped with upgraded computer and multi-media equipment in 1999. The Science Building houses classrooms, laboratories, and faculty offices for the College of Arts and Sciences — including the Departments of Natural Sciences; Mathematics and Computer Science; and Humanities, Social Sciences and Communication. The Academic Achievement Center, the Edward Donley Computer Center and Lewis Veraldi Center for Educational Technology are also here. A 303-seat auditorium is located at the south end of the building.

The Architecture Building, completed in 1962, houses classrooms, studios, and faculty offices of the College of Architecture and Design. A 325-seat auditorium is also here, as well as a gallery for changing exhibits. The University Technology and Learning Center will result in numerous improvements to this building.

The Corporate Services Center, Applied Research Center and the Don Ridler Field House, added in 1987, together offer a wide variety of recreational, meeting, applied research and educational facilities. Corporate Services includes offices for Continuing Education and Professional Development, Small Business Development Center, Student Activities, and student organizations and clubs, including the Student Government and Interfraternal Council. The Field House includes a 1,500 seat gymnasium, exercise track, weight and conditioning room, saunas, racquetball courts, and locker facilities.

The Wayne H. Buell Management Building is a 115,000 sq. ft. structure dedicated in memory of Lawrence Tech’s third president. Opened in 1982, it houses the College of Management, Library, Dining Commons (Café Lawrence), and Bookstore. A student and university lounge and the offices of the President, Provost, Admissions, Dean of Students, University Advancement, Marketing and Public Affairs, and Audiovisual Services are also here. A fully enclosed three-story atrium hosts a variety of special events as well as a copy center, postal kiosk, and ATM.

The Presidents Conference Center, built in 1959 and substantially upgraded in 1996, offers facilities for group meetings and special events. It also houses television studio facilities and The Ford Distance Learning Center.

The Maintenance Building provides storage for supplies, maintenance and landscape equipment.

Outdoor Athletic Facilities include softball diamonds, and football and soccer practice fields.

Plenty of free, lighted, paved parking is available on campus. There are no restrictions limiting student center and computer use of automobiles; however, student vehicles must display a current registration permit (available from the Student Service Center,) and students are expected to obey the University’s parking and speed regulations. Designated visitor and handicap parking is available near all buildings.

The Gregor S. and Elizabeth B. Affleck House, designed by Frank Lloyd Wright and completed in 1941, was given to the University in 1978 by the late Afflecks’ children, (Mrs.) Mary Ann Lutomski and Gregor P. Affleck. The home has been restored by the University and is located in the nearby City of Bloomfield Hills. It is considered an outstanding example of Wright’s work. For information about the Affleck House, contact the College of Architecture and Design.
At Lawrence Technological University, education can be more than credits, courses, and examinations. It can be a total experience of living and learning encompassing recreation, entertainment, student government, athletics, culture, religion, and professional growth. Students may involve themselves in a wide range of campus activities, coordinated by the director of Student Activities. Campus organizations include over 40 departmental clubs, intramural athletics, religious organizations, campus newspaper, fraternities, and sororities. Hobby-oriented clubs represent additional interests. Student Government and student chapters of various professional societies offer leadership and service opportunities.

STUDENT GOVERNMENT
The Student Government was organized by students to assist the University administration in maintaining a progressive, effective, and well-organized program of student activities. With representatives from all recognized campus groups, it manages a substantial budget and appropriates funds for many diverse student activities. It is also authorized to levy fines for such offenses as improper driving or parking, or littering on campus. For further information, see the Student Handbook.

STUDENT PUBLICATIONS
Student-oriented publications include the Tech News, the twice monthly campus newspaper published for students and staff, and the annual literary magazine, Prism. Both publications encourage students interested in writing, photography, graphics and design to become active.

CAMPUS ORGANIZATIONS

Interest-based organizations active on campus include Campus Crusade for Christ, Creative Expressions, Detroit Metropolitan High School Mathematics and Computer Club, Lawrence Christian Fellowship, LTU Musician’s Society, and Student Alumni Council.

The number of student clubs, organizations, and club sports varies each year.
depending upon student interest. One of the best aspects of a moderately-sized university like Lawrence Tech is that you needn’t “wait in line” to become involved. Students interested in starting a club should contact the Student Activities Office.

**FRATERNAL ORGANIZATIONS**

Greek-letter social organizations include the alpha chapter of Phi Kappa Upsilon, Sigma Phi Epsilon, Sigma Pi, and Theta Tau fraternities, and Alpha Kappa Alpha, Chi Omega Rho, Delta Phi Epsilon, and Delta Tau Sigma sororities. The Interfraternal Council coordinates and sponsors several campus activities each year based on student interest including Greek Week, Spirit Week, and service projects.

**ATHLETICS AND GAMES**

Intramural and intercollegiate athletic programs at Lawrence Tech frequently involve a large percentage of the student body. Intramural programs include football, softball, volleyball, wallyball, basketball, indoor soccer, and racquetball. Soccer, golf, hockey and men’s volleyball are offered as intercollegiate club sports.

**HONORS**

Lambda Iota Tau Honor Society (for students in baccalaureate programs) honors students achieving outstanding academic records and exceptional participation in student activities.

Tau Beta Pi is a national engineering honor society. Student members are elected on the basis of superior scholarship and outstanding character. Eta Kappa Nu is a national engineering honor society for electrical engineers. Pi Tau Sigma is the national honor society for mechanical engineers. Chi Epsilon is a local honor society for civil and construction engineers.

Tau Sigma Delta, national collegiate honor society for architecture and the allied arts, has an active campus chapter.

Alpha Rho Chi, a national professional fraternity for students of architecture and the allied arts, awards its medal annually upon recommendations of the architecture faculty in each school of architecture.

The award recognizes the graduating senior who has shown leadership and given service to the school, and whose personality and attitude give promise of real professional worth.

The American Institute of Architects Henry Adams Medal is awarded annually in each accredited architectural school in the United States. The AIA presents the medal to the graduating senior with the highest scholastic standing. A certificate is awarded to the student with the second-highest standing.

**ELIGIBILITY FOR HOLDING OFFICE**

To be eligible to hold office in any campus organization, students must have a cumulative grade point average of at least 2.0. They will be requested to withdraw from office at the end of any semester in which their semester grade point average falls below 1.8. In order to hold a Student Government office, a student must have a minimum 2.3 grade point average. Students who are placed on disciplinary probation may not hold office in student organizations or Student Government while they are on probation.

**STUDENT CONDUCT**

The University is not a sanctuary from greater society, its laws and expectations. Lawrence Technological University has established regulations to provide an environment that encourages personal growth, to reflect the values to which the University subscribes, and to recognize the proximity in which students live and work with one another.

Students are expected to conduct themselves at all times in a manner which will reflect credit on the University. They are expected to have consideration and respect for other students, University personnel, and property. Students who cannot achieve these standards will be subject to disciplinary action. If suspension or expulsion seems warranted, students will be given an opportunity to defend themselves before the Student Discipline Committee.

**Alcoholic beverages**—Lawrence Technological University does not consider the use of alcoholic beverages to be necessary to the process of higher education. While
STUDENT LIFE

persons of legal age, under the laws of Michigan, may consume alcoholic beverages, students are subject to disciplinary action for the public possession or consumption of alcoholic beverages, or for drunken or irresponsible behavior resulting therefrom.

Lawrence Tech defines “public areas” as areas which are readily accessible to students, faculty, staff, and guests on the campus. Examples of spaces considered public are: lobbies, lounges, recreational areas, classrooms, building corridors, offices, and campus grounds.

Computer system misuse—Attempts to invade the privacy or accounts of other users is illegal and violates standards of conduct expected of Lawrence Tech students. Using the computer to distribute unwanted or objectionable messages or to in any way disturb other users of the computer system may result in disciplinary action up to and including expulsion. (See Chapter 1 of the EDCC Computer Users Guide for details.)

Dress and hygiene—There are no specific dress regulations. It is expected that a student’s attire and personal hygiene will not be offensive to others.

Fireworks and firearms—The use or possession of fire-crackers, fireworks, firearms, or any type of ammunition or explosives is prohibited. Failure of students to comply with this regulation will result in penalties up to and including expulsion.

Honesty—The proximity in which students work and live, and the freedoms of campus life, depend on the personal integrity of all members of the University community.

Activities representing an intention to steal, actual stealing, or dishonesty in any form may result in suspension or expulsion from the University. Academic dishonesty includes plagiarism, cheating, forgery, or other acts that deceive or defraud in regard to a student’s own academic work or that of others. Questions of academic dishonesty are reviewed by the dean of the College responsible for the courses in which they occur. When necessary, cases of academic dishonesty may be referred to the Student Discipline Committee. The usual penalty for academic dishonesty is failure in the course on the first offense and expulsion from the University on the second offense.

Irresponsible action—Student participation in activities which elicit public alarm, disturb the public peace, threaten or endanger personal well-being, disrupt or interfere with the orderly processes of the University, or harm public or private property is prohibited. Students who encourage or become involved in such activities are subject to disciplinary action up to and including expulsion.

Littering—Littering the campus grounds, buildings, and facilities is prohibited, and Campus Security is authorized to ticket violators.

Smoking—To respect the rights of non-smoking persons and in concurrence with local and state regulations and health guidelines, smoking is prohibited in all campus buildings. Included are: classrooms, laboratories, studios, offices, restrooms, athletic facilities, dining areas, auditoriums, elevators, corridors, and all other public areas whether or not “no smoking” notices are posted.

Use of illegal drugs—Involvement in the illegal possession, use, sale, or sharing of drugs, or misconduct resulting therefrom is an offense subject to penalties up to and including expulsion. The use or possession of any drugs on the campus may be prohibited by the University. The University expects all students to obey the laws established and enforced by municipal, state, and federal agencies.

Penalties—Minor violations of regulations such as improper parking, littering, holding overdue library books, etc., may result in fines which, if not paid, can result in the University’s refusal to release grades, transcripts, or permits to register. Appeals are possible as provided in the Student Government Constitution.

More serious violations such as vandalism, theft, possession or use of firearms, use of illegal drugs, alcoholic beverage regulation infractions, or irresponsible action may result in probation, suspension, or expulsion as well as criminal prosecution by municipal authorities. The Student Discipline Committee will be the final arbiter in these cases.

In cases of probation, temporary restrictions against participation in specified activities may be imposed, with the possibility of more severe discipline in the event of future violations. Those activities that are restricted and the duration of probation are given to the student at the time of probation notification.

In cases of suspension or expulsion, students will not receive a tuition refund and will receive either a “W” (withdrawal) or “F” (failure) in all classes in progress.

STUDENT DISCIPLINE PROCEDURE

1. The primary office to receive reports of student misconduct is the Dean of Students.

2. If a complaint is filed with the Dean of Students, a letter is sent both by electronic and U.S. mail to the student(s) cited, advising them that they have been accused of misconduct, naming a date that the Student Discipline Committee will hold a hearing, and advising the student(s) to meet with the Dean of Students prior to the hearing.

3. At the meeting with the Dean of Students, the student(s) receive a copy of the complaint. The student(s) are advised of the hearing procedures and who will be present. The student(s) may reply to the complaint in writing, prior to the hearing; and verbally, during the hearing.

4. Following the hearing, the Student Discipline Committee determines the action(s) to be taken.

5. The student(s) are notified in writing of the decision of the Committee.

Student Discipline Appeals—

1. Students have the right to appeal a decision of the Student Discipline Committee, through the Office of the Provost.
2. The appeal must be in writing.
3. The appeal must be submitted within one week of the decision of the Student Discipline Committee.

SEXUAL HARASSMENT

It is the policy of Lawrence Technological University to maintain an academic and work environment free of sexual harassment for students, faculty, staff or any other constituency. Sexual harassment is contrary to the standards of the University community. It diminishes individual dignity and impedes equal employment and educational opportunities and equal access to freedom of academic inquiry. It will not be tolerated at Lawrence Technological University. Brochures available in the Personnel Office and the Office of Student Affairs explain what constitutes harassment, remedies and resources on campus, reporting procedures, and penalties.

LIABILITY DISCLAIMER

Lawrence Technological University shall not be liable for any injuries to, or property damage or loss suffered by, any student regardless of cause. This disclaimer of liability shall apply to, but not by way of limitation, the following:

Any injury or damage incurred on property owned by or under the control of the University, or its subsidiaries, such as classrooms, apartments or other housing, any other structures, all common areas and grounds, and vehicles;

Any injury or damage incurred as a participant, spectator or otherwise in any intramural or intercollegiate or other event or contest, athletic or otherwise, or while in transit thereto or therefrom;

Any injury or damage suffered while engaged in or attending a classroom or related activity, whether required or elective, and regardless of cause;

Any injury or damage suffered by reason of theft, fire, damage by the elements, or other casualty;

Any injury or damage suffered by reason of any act or omission of any University trustee, officer, member of the faculty or staff, employee, contractor or student.

By applying for admission or readmission to the University, or by continuing their enrollment with the University for a subsequent semester, students accept the foregoing disclaimer and agree to be bound thereby. Emergency referrals are made to community agencies. Any expenses incurred are the responsibility of the student.

AFTER GRADUATION

Lawrence Tech alumni include a distinguished group of engineers, architects, scientists, business executives, managers, technicians, attorneys, physicians, governmental officials, educators, and others holding key positions throughout the United States and around the world. Standard & Poor’s ranks Lawrence Tech in the top third of all colleges and universities providing the leaders of America’s most successful companies.

About 80 percent of Lawrence Tech’s over 21,000 degree-holding alumni reside in Michigan and the Midwest, but alumni also live in nearly every state and territory, as well as in Aruba, Australia, the Bahamas, Bermuda, Brazil, Canada, Chile, Colombia, Ecuador, England, France, Germany, Greece, Guyana, Hong Kong, Iran, Ireland, Israel, Jamaica, Japan, Jordan, Lebanon, Malaysia, Mexico, the Netherlands, Nigeria, Norway, Pakistan, Peru, Saudi Arabia, Scotland, Singapore, Sweden, Taiwan, Thailand, United Arab Emirates, Venezuela, and Zambia.

Lawrence Tech graduates are encouraged to remain active with the University through the Alumni Association. The Association holds meetings and sponsors a variety of activities and services for members in the Southeast Michigan area. Chapters elsewhere in Michigan and in Arizona, California, Colorado, Florida, Georgia, Illinois, Indiana, North Carolina, Ohio, and Texas also meet regularly. Several chapters based on academic interest are also active. The Alumni Relations Office coordinates alumni activities and serves as a campus liaison for alumni worldwide.
ACADEMIC COUNSELING AND TUTORIAL SERVICES

All new students, both freshmen and transfers, are expected to attend orientation sessions prior to or during their first semester on campus. During these sessions student opportunities, responsibilities and regulations are presented, and registration is completed. A number of University counselors are available for academic advice, counseling, and registration assistance.

Counselors working with the Dean of Students supplement the academic advising offered by the various colleges. The Coordinator of the Academic Achievement Center also works with the colleges to coordinate services for handicapped students and tutorial services. Contact the appropriate academic department or the Academic Achievement Center for information.

ACADEMIC ACHIEVEMENT CENTER

The Academic Achievement Center (AAC) is a joint initiative between the College of Arts and Sciences and the Office of Student Affairs. This support service is free to all students, staff and faculty. Students may stop in the AAC to meet with study groups, to study alone, or to get tutoring help for classes. Students may be tutored one-on-one or in groups depending on the number of students and availability of tutors. Walk-in tutoring is available (no appointment is necessary) in English, chemistry, math, computer science and physics or whenever students have a question about a particular subject. The AAC is located on the first floor of the Science Building. Hours of operation are Monday through Thursday, 8 a.m. - 8 p.m., and Friday 8 a.m. - 4:30 p.m. Summer hours vary.

ADMINISTRATIVE SERVICES

A Student Service Center is available with extended hours to assist with Business Services, Cashier, Financial Aid, and Registrar requests. It is located in the lobby of the Engineering Building.

AIR FORCE OFFICE EDUCATION PROGRAM

Air Force ROTC is offered to Lawrence Technological University students at the University of Michigan - Ann Arbor. Three and two year scholarships are available in all majors and include tuition, book allowance and a monthly stipend during the school year.

Freshman and sophomore year entail 1 credit hour courses each semester covering introduction and history of the Air Force respectively. Junior and senior year are 3 credit hour courses covering leadership studies and national security affairs respectively. A weekly hour and half lab is required for all courses and a 4-5 week summer field training is usually completed between sophomore and junior year.

Students are selected for scholarships based on a best-qualified basis and subject to Air Force needs. Minimum criteria include: 2.65 cumulative and 2.35 term GPA as well as meeting weight, fitness, medical, citizenship and Air Force Officer Qualifying Test score requirements.

After completing all AFROTC program and degree requirements, students will be
SERVICES FOR STUDENTS

commissioned as a second lieutenant in the Air Force and serve a minimum of four years on active duty (six years for navigators and ten years for pilots). For more information call 734-764-2404.

ATM (CASH) MACHINE

An ATM cash machine is located in the atrium of the Buell Management Building.

BOOKSTORE

The Bookstore is located in the Buell Management Building. Books, instruments, supplies, software, greeting cards, and a wide variety of other items may be purchased here. A spirit shop features clothing and signature items.

CAREER SERVICES

The Career Services Office facilitates the job search process by assisting students and alumni in their search for full or part-time employment. Services include on-campus interviews, job postings through the electronic job board, and an annual job fair. In addition, counseling is available for a variety of career development needs including job search strategies, interviewing skills, and resume writing. An on-line resume service is provided for students who choose to register with the office.

COMPUTER RESOURCES

In the Fall of 2000, Lawrence Tech became one of the first universities in the country specializing in high tech and management disciplines to provide all freshmen with laptop computers.

Lawrence Tech’s Laptop Initiative is a dynamic plan to assure that Lawrence Tech students are well prepared and positioned to take full advantage of advanced learning opportunities, greater access to educational resources, and ultimately, achieve a competitive edge in the workplace!

The Initiative follows several years of study by administrators, faculty, staff, students and others representing the entire campus community. Their conclusion? The level of sophistication now available in laptop computers assures that they can be tremendously helpful to students as they learn, retain, analyze, present, use, and exchange complex technological and graphical information.

The Laptop Initiative represents more than the machines themselves - it is an event that changes, fundamentally, the teaching and learning process. The University is expending considerable resources for staff and faculty training, setting up a service infrastructure, and making extensive improvements to campus facilities that will allow students to utilize their laptops to best advantage.

A branded unit, the LTU TechBook, is supplied at the beginning of each semester to freshman students through a required technology fee arrangement. During the remainder of the semester, a Help Desk provides assistance and on-the-spot exchange and repairs if problems occur.

Lawrence Tech also offers a variety of computer labs and resources. The University’s Edward Donley Computer Center (EDCC) and Lewis Veraldi Center for Educational Technology (LVCET) supply all registered students with free, required computer accounts. The EDCC’s client server central processing units offer extensive and protected disk storage.

All students, faculty, and staff may access personal accounts on this system from their laptop computer, a campus terminal or microcomputer, or from off campus. All can enjoy the best of both worlds; the speed and graphics capability of single-user PC’s; and the seamless connectivity of the central system’s worldwide Internet communication. The combination extends the Lawrence Tech learning experience to innumerable subjects via the Internet. A fiber optic “backbone” provides cutting edge technology and high speed computing and media access to the entire campus.

Through training sessions, self-paced study courses, and other on-line help students learn to use the computer for more than just programming classes. Electronic mail aids in communication between students, faculty, and administrators. Word processing, spreadsheet, and graphics programs are available along with job hunting services from Career Services.

PC’s are available on a first-come, first-served basis along with appropriate software. Ten computer labs and numerous high-powered workstations on campus are available for student use. Generally, these are “open labs,” although occasionally, a lab may be reserved by an instructor for a class period. Reserved lab hours, when in effect, are posted.

COUNSELING

A wide variety of academic and personal counseling is offered on campus, aimed at helping students succeed in their studies, develop study skills, and cope with crisis, stress, or other difficulties. The Office of Student Affairs and the dean of students oversee many counseling activities. Each of the colleges also offer academic counseling and tutoring. (See Student Affairs section.)

DISABLED STUDENTS

The Office of Student Affairs, 248-204-4100, and the Academic Achievement Center, 248-204-4120, coordinate Lawrence Tech’s compliance with Sections 503 and 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. The University does not discriminate against students with disabilities in recruitment, admission, or treatment after admission. In addition, the University makes reasonable accommodations to permit students with disabilities to
fulfill academic requirements and provides effective auxiliary aids to ensure that they are not excluded from programs because of their disabilities. Students who believe that the University may not be meeting these responsibilities or who believe that they have been otherwise discriminated against based upon their disability may contact the Section 504 officer at the Office of Student Affairs, 21000 W. Ten Mile Rd., Southfield, MI 48075-1058.

**DUPLICATING FACILITIES**

Duplicating and binding services are available in the Copy Center in the Buell Management Building atrium at a nominal charge. There are also pay photocopying machines in the library, Engineering Building lobby, and Architecture Building.

**FAX SERVICE**

Fax service (send only) is available at the Bookstore, located in the Buell Management Building.

**FOOD SERVICE**

Cafeteria service is offered during posted hours at Café Lawrence located in the Buell Management Building. Vending machines dispensing a variety of hot or cold foods are also in operation at several campus locations.

**HELP DESK FOR LAPTOPS**

Located in the Atrium of the Buell Management Bldg., the Help Desk provides assistance for students with LTU TechBook laptop computers. Call 248-204-4080 or e-mail to pchelp@ltu.edu/.

**INTERNATIONAL STUDENTS**

New international applicants may receive assistance on admission from the Office of International Student Affairs (M376). Current international students receive assistance from the Coordinator of International Students, room E219, 248-204-2535.

**LIBRARY**

The Lawrence Tech library houses a broad selection of books, periodicals, CD-ROMs and internet database search systems, and microforms selected to enhance the curriculum areas of the University. The library is centrally located on the lower level of the Buell Management Building, and boasts an attractive garden area providing year-round greenery. The staff of professional librarians, on duty during all scheduled hours, is skilled in locating information at Lawrence Tech and at numerous other institutions, and provides individualized and group instruction in how to use the library efficiently. Students have full access to the stacks for browsing and independent research, and can get reference assistance from a librarian whenever the library is open, in-person or by telephone.

An on-line library information system is accessible from the library and elsewhere on campus, and is also available from off campus. It hosts the on-line catalogs of LTU and other libraries, and several database search systems with either abstracts or the full text of periodicals.

When it is desirable to explore collections elsewhere, the library has agreements with many local and outstate academic and public libraries for direct borrowing privileges, or in some cases, through a special pass arrangement. As an alternative, materials can be borrowed from libraries across the nation through a sophisticated interlibrary loan program available through the Lawrence Tech library.

Among its unique resources, the library houses the handsome and self-contained 3,000 volume personal and professional library of the late renowned architect Albert Kahn, and has a complete collection of SAE papers since 1965 on microfiche. Collection strengths include engineering, architecture, management, and technology.

**MOTOR VEHICLES AND PARKING**

All students may have motor vehicles on campus. Plenty of free, paved, lighted parking is provided for students, visitors, faculty and staff. However, parking is by permit only. Student and faculty vehicles must display a current Lawrence Tech registration decal available from the Service Center. Lawrence Tech Security is authorized to levy fines on tickets issued for improper driving or parking. A listing of campus motor vehicle regulations appears in the Student Handbook. The University is not liable for accidents, damage, or theft.

**OPEN DOOR POLICY**

The president’s door is always open to students. Usually after consultation with instructors, department chairs, college deans, dean of students, provost, or other responsible administrative offices, students will find that any concerns will be satisfactorily addressed. If not, students may contact the president’s executive assistant, who will prepare a briefing and arrange a convenient appointment between the student and the president.

**POSTAL AND PACKAGE SERVICES**

A postal supply-vending kiosk is located in the Buell Management Building Atrium. Postage stamps are also available for sale in the Copy Center. Mailboxes for outgoing U.S. mail are located in the lobby of the Architecture, Engineering, Management, and Science Buildings. A Federal Express kiosk is located at the quad entrance to the Buell Building Atrium.
DON RIDLER
FIELD HOUSE

Field House facilities include a gymnasium, weight and conditioning rooms, exercise track (1/11th mile), four racquetball/wallyball courts, and men’s and women’s locker rooms/shower and saunas. The Field House is open during posted hours, six days a week.

SECURITY

Lawrence Tech is patrolled by a security team 24 hours a day. But because no metropolitan area is immune from criminal activity, all students should take an active role in assuring personal safety. Report suspicious persons or activities immediately to Campus Security (available 24 hours a day) by picking up any campus extension phone and dialing ext. 3945. For emergencies, dial *911 (Star-9-1-1) to be connected to Lawrence Tech Security which will contact the appropriate emergency service. From campus pay phones, dial 911 for municipal police, fire, or medical emergencies.

Lawrence Technological University, in full compliance with the Federal Crime Awareness and Campus Security Act of 1990, makes security information available to Lawrence Tech’s students, faculty and staff, as well as admissions applicants and newly hired employees. Statistics on campus crime may be examined at the Security Office, E107. A brochure on campus safety and security, including statistics for the last academic year, is available from the Admissions, Registrar, Marketing and Public Affairs, or Dean of Students Offices.

STUDENT AFFAIRS

The Office of Student Affairs provides services to help students successfully complete their chosen curricula and offers opportunities for fellowship, fun, and rewarding college experiences. The office is located in the Buell Management Building, M108, 248-204-4100.

Student Affairs serves as the central resource for personal, confidential, and non-biased assistance in addressing any concerns a student may have regarding his or her rights and responsibilities as a member of the campus community. Services offered by the Office of Student Affairs include:

• Assistance for students who have a handicapping condition which might affect their performance in the classroom. Student Affairs counselors can act as liaisons between students and faculty. Documentation of the students' medical history will be kept in strict confidence unless otherwise waived.
• Counseling in crisis/stress management, personal development, and education in mental health problems. Current issues that confront college students (sexual harassment, date rape, alcoholism, etc.) can be discussed in complete confidentiality.
• Annual social events to encourage students to interact with other students on campus. Popular programs include: the fall Welcome Back, the Dean's List Recognition Tea, and the Farewell Party.
• Assistance with study skills development and strategies to become self-efficient learners is available in the counseling office. In addition, study skills workshops and computer instruction tutorials may be suggested to help students improve their academic performance. (See Academic Achievement Center.)

STUDENT HEALTH INSURANCE

A 12-month health and accident insurance policy is available to all full-time students at a reasonable cost. Contact the Business Services Office. Students residing in University Housing are advised to secure tenant's insurance on personal possessions.

STUDENT LOUNGES

Student lounges are located in every building; in the fireplace area of the Engineering Building, in the lower level of the Architecture Building, in the foyer of the Science Building and in M218 of the Buell Management Building.
Lawrence Technological University’s Housing Center offers 142 apartments for single or married men and women students. More than 400 residents can be accommodated in the one bedroom and two bedroom units which, based on the unit chosen, can house groups of two, three, or four students.

On-campus living is more than just convenient—it’s a terrific way to take complete advantage of the full range of academic, social and other opportunities that are an important part of the university experience. Meeting and getting to know new people from other areas; working with and obtaining help from professors outside of class; using computer, laboratory, recreational and other University facilities with greater ease and frequency—these are among the many advantages offered by living right on the campus.

LTU Community Leaders are a group of students living within housing who are responsible for developing a “living and learning” environment (bringing people with similar interests and lifestyles together). Community Leaders get to know each resident, and help find activities on campus in which residents may be interested. Community Leaders also help suggest academic support services that may be needed, and familiarize residents with the surrounding area. Movie nights, intramural sports, comedy clubs, multi-cultural gatherings, and holiday parties are just a few of the activities Community Leaders help plan and publicize.

THE BUILDING AND THE AREA

The nine-story Housing Center is located on the south side of the University’s 115-acre campus. Neighborhood shopping centers are located nearby, as are restaurants, banks, service stations, dry cleaners, and other services. Two regional shopping malls are within a five minute drive and the entire metropolitan area is easily accessible via the nearby Lodge (M-10) and I-696 freeways. Taxis and limited bus service serves the area.

The apartment units are modern and comfortable. All units are air-conditioned and carpeted. Window treatments are provided and most units have doorwalls and walkout balconies. Plenty of counter space and storage is provided in the kitchens, each fully equipped with a full-size refrigerator, stove, sink and garbage disposal.

Most apartments are completely furnished with a sofa, occasional tables, lounge chairs, desks, dining table and chairs, beds, and dressers, but a number of unfurnished apartments are also available. Coin-operated laundry facilities are provided in the building. There are no provisions for children or pets.

Around-the-clock security is provided by a University security team which also staffs a full-time communication center in the building lobby. Free, lighted parking is provided for all residents in a paved lot immediately adjacent to the Housing Center.
A community room with catering and meeting facilities is available for recreation, group events, and presentations.

A computer lab in the building connects to the Edward Donley Computer Center on the campus and offers direct access to the University’s computer resources and the Internet nearly 24 hours a day. All of the academic resources of the University including the classrooms, the library, and the laboratories are close at hand.

Residents also have many opportunities to enjoy the personal and social experience that are an important part of a university education. The recreational facilities of Lawrence Tech’s Don Ridler Field House and outdoor fields are only a short walk or bike ride away. The recreational facilities of the nearby Southfield Civic Center are available to residents and include tennis courts, handball courts, a nine-hole golf course, Olympic-size pool and indoor ice rink.

**MOVING IN**

All students are eligible to rent apartments, but the supply of units is limited and admission to the University does not guarantee the availability of housing. A $50 fee is required with each housing application, but payment of this fee does not guarantee a reservation. Housing reservations are made on a first-come, first-served basis in the sequence in which the completed application forms and fees are received. Early application therefore helps assure availability and the greatest choice of housing opportunities. When a reservation for space is confirmed, the application fee is then applied toward the required security deposit which will be returned when the apartment is vacated if it is clean and undamaged beyond normal wear and tear.

The rental fee, payable by semester in advance, includes heat, air conditioning and all utilities. Basic monthly telephone service and access fees, local calls and voice mail are included in the rental fees. Long distance and zone calls are extra. Rates are very competitive with other nearby apartment complexes.

For current rent schedules, housing applications or additional housing information, contact the Manager of University Housing at 248-204-3940, or write: University Housing Manager, 21000 West Ten Mile Road, Southfield, MI 48075-1058. The Housing Office is on the first floor of the University Housing Center.

**OTHER RENTAL HOUSING**

The Southfield and metropolitan area abounds with a variety of privately owned rental housing, ranging from rooms, small homes or duplexes available from individuals to large complexes containing hundreds of units. Most require 12-month leases. The Detroit daily and suburban community newspapers, including the Southfield Eccentric and Royal Oak Tribune, contain local rental advertising.

**RENTERS INSURANCE**

Students residing in University Housing, or in locations other than the family home, are advised to secure tenant’s insurance on their personal belongings and furnishings.
"All the worthwhile and precious things in life are only obtained through continuous and exacting effort, and their worth is in direct proportion to the effort put forth for their attainment."

–Russell E. Lawrence
1889-1934

It was a firm belief in the future that motivated Russell E. Lawrence to found a university in 1932 — in the midst of the economic chaos of the Great Depression. While less farsighted individuals made predictions of gloom, Russell Lawrence and his brother, E. George Lawrence (who ably led Lawrence Tech during its formative years from 1934 to 1964) turned a dream of preparing students for leadership in the new technical era into reality. Lawrence Tech continued to prosper and accelerate its growth under the guidance of Wayne H. Buell, president from 1964 to 1977, and chairman of the board and CEO until 1981.

Several new buildings, graduate degrees, and massive growth of computer facilities marked the presidency of Richard E. Marburger, who served as president from 1977 to 1993 and also served as chairman of the board of trustees and chief executive officer from 1981 to 1993.

Charles M. Chambers was named president and chief executive officer July 1, 1993, and has overseen significant enhancement of the University’s international reputation as a distinguished center of technological education and research, through such efforts as the Pacific Rim scholars program, the national alumni service campaign, and the minority careers development initiative. A campus master plan has been adopted to guide the University well into the new century, and early achievements include construction of the University Technology and Learning Center, establishment of a Faculty Senate, conversion of the computer system to a client server model with full Internet connectivity and on-line library, a distance learning complex, and expanded bookstore, dining and student activity facilities.

A five year strategic plan was adopted in 2000 and sets a vision for the University to fulfill its mission and address its purposes. The University is currently implementing a Banner integrated student information system.

The University was called Lawrence Institute of Technology until January 1, 1989, when the present name was approved by the State of Michigan, more clearly describing the undergraduate and graduate mission of the institution.

Lawrence Tech was founded on the principle that every person should have the opportunity for a college education. There were no restrictions on entering students relating to race, sex, color, creed or national or ethnic origin — only the requirement that students qualify for admission and have the desire to succeed. Working students could earn a baccalaureate degree by attending evening programs, day programs, or a combination of the two — a feature unique in 1932 and still remarkable today.

Originally established as a College of Engineering with only a few hundred students and a handful of faculty, academic progress and growth of
programs have led to a current enrollment of approximately 5,000 students and 300 full- or part-time faculty.

In terms of enrollment, Lawrence Tech is among Michigan’s largest independent colleges.

In 1952 the College of Management was added, having its origins in an earlier industrial engineering curriculum. Masters programs in management were launched in 1989. The College of Architecture and Design evolved in 1962 from the former architectural engineering department, and in 1993 inaugurated a M.Arch. program. The College of Arts and Sciences was established in 1967. Associate programs were added to Lawrence Tech’s baccalaureate offerings in 1950. Masters programs in engineering were begun in 1990 and in Arts and Sciences in 1997.

Concurrently, there has been an enormous expansion and improvement of facilities. The University’s first home was located in Highland Park, immediately adjacent to the huge manufacturing facility where Henry Ford perfected the moving assembly line. In 1955, the University acquired acreage and opened a new building in Southfield on what had been a General Mills research farm. The campus has since expanded to 115 acres and nine major buildings, as well as the Frank Lloyd Wright-designed “Affleck House” in Bloomfield Hills, donated to the University in 1978.

In 1977, Lawrence Tech shed its “commuter” classification by opening a nine-story University Housing structure. The 1980s and ‘90s were distinguished by the opening of the Wayne H. Buell Management Building and the Don Ridler Field House, numerous improvements to existing buildings, and a substantial increase in state-of-the-art laboratory and computer equipment. A $20 million, 85,000 sq. ft. University Technology and Learning Center was completed in the spring of 2001.

**ADVANCED TECHNOLOGY ACADEMY**

The Advanced Technology Academy at Lawrence Tech is a Michigan charter school offering a challenging curriculum closely linked to the University’s academic mission. High school students with an aptitude for computer science, engineering, and management can begin a university-caliber education while still in high school, and gain university credits before graduating. The Academy is funded through state public education funds in the same manner as other charter schools and tuition is free. The ATA opened in the Fall of 2000 for high school juniors and seniors. Earlier grades may be added in the future. For information about the ATA, phone 248-204-3980.

Michigan’s first TV signals were beamed from University labs by the Lawrence Tech Television Society in 1937.
The University has a selective admissions process — the objective of which is to identify men and women who have the highest potential for advancement in their chosen field of study. While the applicant’s academic record is a reliable measure for the prediction of academic success, the admissions decision is more complex than admitting students on the basis of a numerical formula. With this intent, Lawrence Tech considers, in addition to the applicant’s previous academic record, factors which demonstrate an aptitude for successful study.

For the admissions requirements for any of Lawrence Tech’s graduate degree programs, see the Graduate Catalog.

**FRESHMAN ADMISSION REQUIREMENTS**
*(Undergraduate Programs)*

1. A completed application for admission with the non-refundable fee and official high school transcripts. If the student is attending high school when accepted to Lawrence Tech, the student must make arrangements to have a final official copy of the transcript sent to the Lawrence Tech Admissions Office upon graduation;
2. A high school diploma or GED equivalent;
3. Generally, a minimum of a 2.50 GPA in academic subjects with a 2.00 GPA or better in academic subjects that pertain to the desired program of study. Academic subjects include language and literature, social sciences, mathematics and natural sciences. Admission into associate degree programs requires a GPA of 2.00 or better in individual academic subjects and an overall GPA of at least 2.00. Advanced placement and honors courses taken in high school are given special consideration;
4. An official copy of the American College Test (ACT) or the Standard Achievement Test (SAT) scores. Scores should be sent to Lawrence Tech, school code 2020.

**PLACEMENT EXAMINATIONS**

All entering freshmen must take placement examinations appropriate for their majors. Examination topics include mathematics, English, chemistry, physics, and computer literacy.

New transfer students are required to take placement exams in areas in which they do not have transfer credit. If the transfer student has been placed into a course already completed successfully elsewhere, the results of the placement exams are for advising only. Past experience has shown that students who ignore placement results perform poorly in classes for which they are not prepared. Placement exams are given during the Orientation and Registration program.

Information concerning placement exams will be sent to those students needing the exams upon acceptance into the University. For further information about the exams, contact the Admissions Office at 800-CALL-LTU, ext. 1.
PREREQUISITES
(BASIC STUDIES)

High school graduates and transfer students who meet admissions requirements but lack adequate proficiency in courses basic to their chosen degree may be admitted subject to the satisfactory completion of appropriate Basic Studies courses. College level courses in intermediate algebra/geometry, college algebra, trigonometry, chemistry, physics, and English are available for this purpose. These courses do not provide credit toward most degree programs offered at Lawrence Tech. A student’s enrollment in certain courses is restricted until Basic Studies courses have been satisfactorily completed.

TRANSFER ADMISSION REQUIREMENTS

1. A completed application for admission and non-refundable fee;
2. Official transcripts sent from each institution to Lawrence Tech’s Admissions Office;
3. A minimum GPA in the following categories:
   a) Students with 30 or more semester hours completed are required to have a minimum of 2.00 GPA;
   b) Students with less than 30 hours completed at another institution must also submit official high school transcripts and meet the freshman requirements above;
   c) Students applying for admission to the Bachelor of Science in engineering technology must have completed an associate degree which has been approved by the Department of Engineering Technology. A minimum 2.00 GPA and successful completion of all necessary prerequisite course work is required;
4. Students applying for admission to architecture and design must have a minimum 2.30 GPA.

Lawrence Tech has entered into agreements with several area community colleges which establish in advance which community college courses may be applied to earn a Lawrence Tech degree. Lawrence Tech will grant admission to students who complete the specified community college associate degree program and will award the prescribed degree to students who complete the Lawrence Tech courses listed in such an agreement and who otherwise meet graduation requirements.

Transfer students pursuing a baccalaureate degree are expected to complete a minimum of 60 hours of junior and senior level course work, a minimum of 30 hours of which must be taken at Lawrence Tech.

Undergraduate transfer credit procedure. The University will accept all courses with a grade of 2.00 or better from a completed General Education program of an approved four-year college or of a community college associate degree designed for transfer to a four-year institution. Approved colleges include regionally accredited community colleges and four-year colleges and institutions, as well as others approved by Lawrence Tech. Such students will be expected to have demonstrated competencies in the following categories:

- a) communications beyond English composition
- b) knowledge of the humanities
- c) knowledge of the social sciences
- d) mathematics, including calculus
- e) science, including a laboratory science

If the total number of semester hours in each category of competency are less than those required by Lawrence Tech, the student will take additional General Education courses at Lawrence Tech to fulfill the requirement.

All Lawrence Tech students, including those certified to have met General Education requirements elsewhere, must complete an upper division course in language and literature or social science as part of their Bachelor’s degree program. In those cases where a General Education course is required as a prerequisite for courses in the major, the prerequisite must be completed even if the general education requirement is met otherwise. The accreditation specifications of a particular professional degree may require students to complete additional depth and breadth course work in general education.

Transfer students who enter Lawrence Tech without general education requirements completed will be required to complete the Lawrence Tech General Education requirement as established for their degree program. In this regard, individual General Education courses taken elsewhere will be considered for substitution for Lawrence Tech courses.

Transfer students will have
their official transcripts evaluated and receive a Credit Evaluation prior to their enrollment. The Credit Evaluation lists all courses required for a specific degree program in accordance with guidelines provided by the major college and the College of Arts & Sciences for the general education component. All courses listed are required unless transfer credit has been granted or if the student has been excused. If excused from a course, an “EX” will appear in the Credit Hours Transferred column and the student must complete the same number of credit hours in another course acceptable to his or her academic advisor.

If courses are in progress at the time of acceptance, students must request that a complete and official transcript be sent to the Lawrence Tech Registrar and ask that their academic advisor evaluate such courses during the first semester of enrollment.

**Additional credit.** All transfer credits are subject to the review of the department chairman or dean of the College. Questions concerning credit evaluations and any appeal for additional credit must be resolved by the Admissions Office within the first semester of enrollment.

**ROTC/Military credit.** Credit earned in the Reserve Officers Training Corp and credit for military training may be applied toward degree work in several Lawrence Tech programs, and will be considered according to the recommendations of the American Council on Education. Contact the Admissions Office for additional information.

**Other forms of additional credit.** High school students may earn credit with satisfactory results on Advanced Placement Examinations (AP).

Credit may also be obtained through the College Level Examination Program (CLEP) for subject examinations only. CLEP information is available through local libraries and the Admissions Office.

Courses offered by non-collegiate organizations will be considered for credit only if they have received credit recommendation from the National Program on Non-Collegiate Sponsored Instruction (National PONSI). Transfer credit will be considered on an individual basis. In all cases, students are required to demonstrate that they had the appropriate academic preparation for the non-collegiate course at the time it was taken.

No more than 30 semester hours of credit will be accepted from the sources listed above. A request for credit from these sources must be resolved with the Admissions Office within the first semester of enrollment. Credit for PONSI and military courses will not be shown on the students’ transcript until all other requirements for the degree have been met. Students will not receive credit from the above sources if the work is carried out while they are enrolled at Lawrence Tech or during the summer between terms of enrollment. Any exceptions will require prior written permission of the Credit Review Committee.

**NEW TRANSFER STUDENT SEMINAR**

New transfer students are required to attend a seminar “Information Station.” This three-hour seminar helps new students become familiar with the policies of the University and to be trained on the University’s computer system. The Information Station is held just before or at the beginning of each semester. Students register for the seminar when they register for their regular classes.

**ADMISSION TO GRADUATE PROGRAMS**

For information on any of Lawrence Tech’s graduate programs, see the *Graduate Catalog*.

**GUEST STUDENT ADMISSION REQUIREMENTS**

1. A completed Michigan Uniform Guest Application from the Michigan institution in which the student is enrolled which specifies the courses to be taken and includes the approval and official seal of the academic advisor and/or registrar.

2. A copy of the college transcript (high school transcripts or other college transcripts may be required if the prerequisite was taken at an institution other than the current one). Students not currently enrolled in collegiate programs and those who attend institutions outside of Michigan must apply as a transfer, freshman, or graduate student, or as a non-degree special student. Guest students are allowed to enroll in specific courses for which all prerequisites have been met and for one semester only. Lawrence Tech students have enrollment preference over guest students.

**NON-DEGREE SPECIAL STUDENTS AND CURRENT HIGH SCHOOL STUDENTS**

Undergraduate students who elect to take courses but who do not wish to pursue a degree program may enroll as a special student by submitting the following to the Admissions Office:
1. A completed application for admission (see Non-Degree Special Student section of application) and the non-refundable fee;

2. Unofficial copies of transcripts from institutions attended (high school transcripts may also be required). Non-degree student status will be granted for one semester only. A non-degree student who wishes to obtain regular admission to an undergraduate program must make a regular application to that program and meet all regular admissions requirements. Credit for courses taken while a non-degree student may be applied toward the degree if approved as part of the admissions process.

When courses taken as a non-degree student are applied toward a degree, the cumulative GPA will be computed from all undergraduate courses taken at Lawrence Tech.

High school students who wish to take classes at Lawrence Tech before graduation must have approval from their high school principal and Lawrence Tech’s Admissions Office, and submit the following:

1. A completed application for admission and the non-refundable fee;
2. Official high school transcript;
3. A completed Lawrence Tech application supplement for high school students (request from the Lawrence Tech Admissions Office).

Students may reapply through the Registrar’s Office under the following conditions:

1. returning within three calendar years;
2. academically eligible to return;
3. returning to an undergraduate degree program.

Students must reapply through the Admissions Office, and pay the application fee, under the following conditions:

1. returning after more than three calendar years;
2. beginning a new degree program after graduation from Lawrence Tech;
3. academically ineligible to return (suspended, dismissed); in this case the student must also seek readmission from the Academic Standing Committee.

CHANGE OF MAJORS

Currently enrolled students desiring to change majors within their College (example: mechanical engineering to electrical engineering) do not need to reapply for admission. Students should contact the dean of their College and complete the appropriate change of curriculum form.

RETURNING ALUMNI

Lawrence Tech alumni may enroll in courses for which prerequisites have been met without reapplying for admission. If another degree is desired, alumni must submit a completed application for admission and the non-refundable fee to the Admissions Office and must meet normal admission requirements. The fee is waived for graduates applying to a master’s program.
Lawrence Technological University sets tuition rates with the one goal of providing students with the best possible educational experience. The emphasis is on quality. Concurrently, the University has a long tradition of prudent management that has allowed it to contain costs and provide students with extraordinary value for their tuition investment, but never at the expense of Lawrence Tech’s primary emphasis.

Tuition at Lawrence Technological University is used to cover many of the costs associated with a student’s education. Remaining expenses are funded through support from the University’s alumni and friends, including gifts from individuals, corporations, and foundations.

Tuition and fees are normally established on an annual basis. However, the University reserves the right to make changes in these charges or to initiate or delete charges without notice. The schedule of current tuition and fees is published separately from this Catalog and is available from the Lawrence Tech Admission, Business Services, or Registrar’s Offices.

PAYMENT OF TUITION AND FEES

Tuition and fees are due in full at the time of registration. Otherwise, the student automatically chooses the deferred payment plan. The plan (which is not available for classloads less than five credit hours) requires a minimum down payment as stipulated by the University. Students are granted a 30-day grace period in which to pay their tuition balances in full. If their balances are not paid in full 30 days after classes begin, an administrative charge is added to their account. Subsequently, if a balance is still outstanding after 60 days from the first day of classes, an additional charge will be added to their account.

Transcripts, diplomas and/or permission to register for subsequent classes will not be issued if an outstanding balance appears on a student’s account.

Financial clearance is granted by the cashier when past obligations are paid in full and one of the following conditions is satisfied:

• A sufficient down payment is deposited; or
• Billing authorization forms are submitted when the employer is to be invoiced by the College; or
• The student’s name appears on a list furnished by a responsible agency (scholarships, grants, etc.).

COSTS FOR WITHDRAWAL

Costs for withdrawal are established as stipulated by federal regulations. The dates of actual credit to be received for withdrawal may be obtained at the Registrar’s Office.

Administrative charges are added to student accounts after 30 days on any unpaid balances.

Withdrawal percentages refer to the tuition for courses dropped. Registration fees and course fees are non-refundable and not included in the withdrawal credit calculations. Balances remaining after drop adjustments must be paid. Credit balances will be refunded.

The first day of classes as listed in the University Catalog is the day the semester begins.

Date of withdrawal is the date the student’s drop form is validated by the Registrar’s Office or the postmark date of letter of withdrawal.
Helping both new students and upper-classmen with their financial planning is the role of Lawrence Tech’s Office of Student Financial Aid. Approximately two-thirds of the University’s students receive financial assistance. Financial assistance totals more than $14 million annually — $6.5 million in outright grants and scholarships, and $7.5 million in low-interest loans.

Through various private, state, and federal programs, the Office of Financial Aid offers aid to some 2,600 students. In addition, more than 500 students are provided about $1.3 million in tuition reimbursements or support each year by their employers. Good students should not be dissuaded from pursuing quality because they assume a Lawrence Tech education is beyond their means.

STATE TUITION GRANTS AND SCHOLARSHIPS FOR MICHIGAN RESIDENTS

Lawrence Tech students in need of financial aid have a special opportunity for assistance through the State of Michigan Tuition Grant program, exclusively for students attending Michigan independent colleges. Lawrence Tech students may receive outright grants of $100 to $2,700 toward yearly tuition throughout their undergraduate college careers, the amount depending upon need and availability of funds.

The State also has a scholarship program, the Michigan Competitive Scholarship, for students enrolled in public or private Michigan colleges.

Michigan Competitive Scholarships are awarded on the basis of the American College Testing Examination and demonstrated financial need. Lawrence Tech students are also eligible for State scholarships if they are Michigan residents.

Last year more than 1,200 students received Michigan scholarships or tuition grants.

Requirements. To qualify for a State tuition grant or scholarship, an applicant must be a U.S. citizen or have declared his or her intention of becoming a citizen; must have been a continuous Michigan resident since July 1 (last year) and must be at least a halftime student (minimum of 6 hours).

How to apply. To apply, a student should complete a Free Application for Federal Student Aid (FAFSA), reading carefully all of the instructions, and return the form as indicated in the instructions. The FAFSA is available from high school counselors or on the Web. Go to www.ltu.edu and find the link for FAFSA On The Web.

Deadlines. To obtain a tuition grant for the semester beginning in the fall, students should fill out the FAFSA and return it for processing in early spring. The final deadline is September 1. Students are encouraged to file early in order to know their financial aid status well in advance of the fall semester.

New students should complete the FAFSA prior to February 15th for Michigan Competitive Scholarship consideration. Continuing students should apply prior to March 15th for scholarship consideration.

OTHER MICHIGAN PROGRAMS

Michigan Adult Part-Time Grant — Eligible students must be self-supporting and independent, taking between 3 and 11 credit hours, and qualify for either the Pell Grant or State of Michigan Tuition Grant. Students must also be making satisfactory academic progress and have been a Michigan resident for the past 12 months. Awards range from $100 to $600 per year.
Michigan Work Study — This program is designed to help students pay for their education by providing them with employment. Students may work on campus in any capacity, including work in academic departments and administrative offices as well as library work, landscaping, and maintenance work. A student must demonstrate financial need to be eligible for the Michigan Work Study program. Federal minimum wage is paid for MWS students.

**LAWRENCE TECH ACADEMIC SCHOLARSHIPS**

Completion of the financial aid application process is a requirement for all Lawrence Tech Scholarships and grants.

**Lawrence Tech Scholarship**—Lawrence Technological University annually offers 40 scholarships to first-time students who are high school graduates with a 3.00 GPA or better. Financial need is not a requirement. Applications, available from the Financial Aid Office, must be received by March 1 for scholarships beginning the following fall.

Applicants may be day or evening students enrolled for at least 12 credit hours per semester and must submit scores from the ACT examination.

Each Lawrence Tech scholarship is for tuition reimbursement up to $12,000 for each of four years, and is renewable at the discretion of the Scholarship Committee. Five of the 40 scholarships are available to qualified transfer students from community colleges. The remainder are awarded to high school graduates.

**University Honor Scholarships** — Lawrence Technological University annually awards a number of University Honor Scholarships to first-time students who have a 3.00 GPA or better and an ACT composite of 24 or higher. The scholarship is renewable up to three years if the student maintains a 2.7 cumulative GPA or better. Transfer students are also eligible for University Honor Scholarships, and must transfer a minimum of 24 hours with a 3.00 GPA or better to qualify. The award is a $5,000 scholarship and is given for eight semesters if the student maintains a full-time student status and a 2.7 GPA or better while a student at Lawrence Tech.

**Trustee Scholarship** — Lawrence Technological University annually awards an unlimited number of Trustee Scholarships to first-time students who have a 3.00 GPA or better and an ACT composite of 24 or higher. The scholarship is renewable up to three years if the student maintains a 2.7 cumulative GPA or better. Transfer students are also eligible for Trustee Scholarships, and must transfer a minimum of 24 hours with a 3.00 GPA or better to qualify. The award is a $5,000 scholarship and is given for eight semesters if the student maintains an enrollment of at least 6 credit hours and a 2.7 GPA or better while a student at Lawrence Tech.

**SCHOLARSHIPS FOR CONTINUING LAWRENCE TECH STUDENTS**

Applications, available through the Scholarship Committee chairperson, must be received before May 15 for scholarships beginning the following fall. Recipients enrolled in baccalaureate programs must have junior or senior standing. Recipients enrolled in associate programs must have completed a minimum of 45 hours of course work of which at least 30 hours was completed at Lawrence Tech.

Day or evening students are eligible for the following scholarships, which range from $500 to $5,000 per year.

**Elaine Albers Scholarship** — Established by the leading architectural firm of Jon Greenberg & Associates in memory of a former colleague. This scholarship, in the amount of $2,000, is designed to assist a woman 29 years or older enrolled in the College of Architecture and Design. A minimum 3.00 GPA is required.

**Alumni Legacy Grant** — A number of grants, varying in amounts, are awarded to dependents of Lawrence Tech alumni. This program is made possible by the generosity and cooperation of the Lawrence Tech Alumni Association.

**Henry J. Beam Scholarship** — Established by Henry H. Beam in memory of his father, a longtime trustee of Lawrence Tech. This scholarship, funded by Henry H. Beam and his daughter, Catherine, is awarded to an outstanding upperclassman in engineering or management and is valued at $500 per year.

**William H. Bibbens Scholarship** — Made possible by the generosity of Elizabeth V. Bibbens in memory of William H. Bibbens, Jr. and Sr. Awarded to an incoming freshman majoring in engineering and specializing in manufacturing engineering. Based on high scholastic performance and financial need. $5,000 awarded annually, renewable up to four years.

**Cleophas Buck Memorial Scholarship** — Established in memory of Prof. Cle Buck, a longtime College of Management faculty member, through the generosity of family, friends, and past and present students. A $700 scholarship for an outstanding upperclass student from the College of Management.

**Wayne H. and Vita S. Buell Scholarships** — Through a bequest from Lawrence Tech’s third president and his wife, full-tuition scholarships plus a book and supply stipend are offered to outstanding students entering the University for the first time. Candidates must be in the top five percent of their high school graduating class.

**Chrysler Minority and Women Scholarship** — Through the generosity of Chrysler Corporation, a number of scholarships will be awarded yearly to minorities and women in undergraduate and graduate programs. The amount of the scholarship will vary and applicants must have a 3.00 GPA or better.

**Concrete Improvement Board (CIB) Endowment Scholarship** — Made possible through a generous contribution by the Concrete Improvement Board. A $1,500 award to a junior or senior student with a 3.00 GPA or better in civil engineering or architecture.
Carl W. and Jeanne E. Cowan Scholarship — Made possible through the generosity of Carl Cowan, ME’40, and his wife, Jeanne. A yearly scholarship of $1,000 each, awarded to junior or senior students, preferably in engineering, with a GPA of 2.5 or better.

D.I.T. Endowed Scholarship — Children and descendents of Detroit Institute of Technology alumni who have a 3.00 GPA or better in high school are eligible to receive this scholarship. The amount of the award will vary each year.

Ford Motor Company Scholarships — Ford Motor Company scholarships are offered to engineering and management juniors and seniors with a 3.00 GPA or better. Awards range from $1,000 to $2,000. Designated for minority students only.

The Oscar and Lynn Freimann Scholarship — Through the generous bequest of the distinguished Detroit architect, Oscar Freimann, the dean of architecture may award a number of annual scholarships to architectural students, ranging in value from $400 to $1,700. These awards are based on scholarship as well as the student’s demonstrated skills in architectural drawing.

Berry Gordy Sr. Scholarship — Through the generosity of the Berry Gordy Foundation, a $1,000 scholarship is awarded annually to a minority with a 2.7 GPA or better.

Myron J. Greenman Scholarship — Made possible through the generosity of Myron J. Greenman. Awarded to an evening student with a 3.00 GPA or better. This $1,500 award requires a minimum of 6 credit hours to be taken each semester.

Hobson Memorial Scholarship — Sponsored by the Metropolitan Detroit Construction Specification Institute in memory of Robert T. Hobson, AIA,CSI, a member and one of the educational leaders of the Detroit Chapter. Several scholarships are awarded annually to upperclass architecture students with at least a 3.0 GPA. Number and value vary each year.

Martha Bichler Horlít Scholarship — Made possible through the generosity of Henry and Barbara Horlít. Awarded to a sophomore, junior or senior engineering major, preferably in manufacturing. A minimum of 12 semester hours required each semester for the $1,500-$2,000 award. A cumulative GPA of 3.0 or better is required.

Paul M. and Ann W. Jocham Scholarship — Made possible through the generosity of the late Paul M. Jocham, IE’54, and his wife, Ann. Awarded to a full-time evening baccalaureate degree student with a 3.00 GPA or better. $1,000 awarded annually.

Lawrence Tech Construction Alumni Scholarship — Set up through a fund-raising process established by the LTCAS Fundraiser Committee. Scholarships are awarded annually to sophomores or juniors in civil engineering or construction technology.

Christian F. Madsen Memorial Scholarship — Made possible through a generous contribution from the Madsen family in honor of their son, Christian, a 1960 engineering graduate. A $1,200 scholarship awarded to an engineering student with a 3.00 GPA or better.

Masonry Institute of Michigan Scholarships — Funded by the Masonry Institute’s Annual Scholarship Benefit Golf Outing. A number of $1,000 scholarships are awarded annually to architecture students having at least a 3.00 GPA. The awards are made by the Masonry Institute through an interview process.

Brian Mutnick Memorial Scholarship — Funded by the Erwin Mutnick and Gary Mutnick Families in memory of their beloved son and brother. An annual $500 scholarship to a junior or senior architecture student with a 3.00 GPA or better.

Calvin and Rosemary Opperthauser Scholarship — Made possible through a generous contribution from Calvin Opperthauser, EE’51, and his wife Rosemary. The award is given to a junior or senior engineering student with a 3.00 GPA or better that demonstrates financial need.

Richard Rochon & Associates Scholarship — Made possible through the generosity of the exceptional illustrator, Richard Rochon. A $500 scholarship for an outstanding upperclass student in architectural illustration as determined by a portfolio of work and a 3.00 GPA or better.
William A. Rosso Scholarship — Made possible through a generous contribution from the William A. Rosso family. New freshmen entering into architecture and engineering and residing in the Royal Oak, Birmingham or Clawson school districts are eligible. The amount of the award will vary each year.

Philip Rothwell Memorial Scholarship — Made possible through a generous contribution in memory of Philip Rothwell. The $2,000 award is given to a junior or senior Mechanical Engineering student with a 3.50 cumulative GPA. A minimum of 6 credit hours must be taken each semester.

M. M. Ryan Scholarship in Chemistry — In memory of Mordica M. Ryan, former chemistry department chairman and dean of academic affairs at Lawrence Tech, this scholarship is awarded to an entering freshman majoring in chemistry. A 3.50 GPA or better is required. Candidates must also demonstrate strong verbal and mathematical skills. The scholarship covers tuition and registration fees.

S.E.M.B.O.I.A. Scholarship — Two $1,000 scholarships offered by the Southwestern Michigan Builders Association to junior or senior students from architecture or engineering with a 3.00 GPA or better.

Arthur F. Smith Design Scholarship — Established by Arthur F. Smith, BAr’81, BSAr’78, of Arthur F. Smith, Architects. A $1,500 scholarship or more awarded annually to a student currently enrolled in the architecture degree program and who has applied, and been accepted, into the graduate program in architecture. A minimum 3.00 GPA is required.

Edward C. and Hazel L. Stephenson Foundation Scholarships — Made possible by the generous commitment of the Foundation’s Board of Trustees to assist deserving students. Several scholarships are awarded annually by the Stephenson Foundation Scholarship Fund to upperclass baccalaureate students. Award varies depending on financial need. A 3.00 GPA or better is required.

E. Martin Tallberg and Florence L. Tallberg Scholarship — From the estate of Florence L. Tallberg, two yearly $800 scholarships are awarded to upperclass baccalaureate students presenting a 3.00 GPA or better.

Upperclassmen Scholarships — Academic scholarships in the amount of $2,000 are available to juniors and seniors in each of the four Colleges who demonstrate a strong GPA.

Yamasaki Scholarship — A $1,000 scholarship awarded annually to a student enrolled in the Graduate College of Architecture.

Neal F. and Esther Zalenko Scholarship — Made possible through the generosity of Mr. and Mrs. Zalenko, friends of Lawrence Tech. A $2,000 scholarship is awarded annually to a student majoring in business. Preference given for financial need.

FEDERAL BENEFITS FOR VETERANS

The Veterans Administration provides a wide range of benefits to veterans. Veterans should contact the V.A. on questions concerning eligibility. New programs for some reservists and active duty personnel eligible for benefits are available as well.

The amount of the monthly allowance for Lawrence Tech veterans is based on the number of credit hours, the number of dependents, and the specific program of qualification.

All veterans receiving G.I. benefits are expected to maintain satisfactory academic progress. V.A. regulations permit only a two-semester probation period unless there are mitigating circumstances as determined by the V.A. The University will inform the Veterans Administration and the student when the veteran does not meet academic standards of progress and is no longer eligible for benefits.

For additional information and details, contact the Office of Financial Aid.

LOANS FOR STUDENTS

Federal Subsidized Direct Loans — A maximum of $2,625 for freshmen, $3,500 for sophomores, $5,500 for juniors and seniors, and $8,500 for graduate students is available through the Federal Government. Students must demonstrate financial need to apply for the subsidized direct loan. The federal government pays interest on a subsidized loan while the student is in college. This is a variable
interest rate loan. Repayment is postponed until after graduation. See the LTU website for further information.

**Federal Unsubsidized Direct Loans** — (Amounts same as above.) The student pays interest on an unsubsidized loan while in college, but not the principal. Students who do not show need may apply for the unsubsidized direct loan.

**Federal PLUS Loans** — Students that are dependent students can borrow up to $10,000 per year from the PLUS Loan Program. A parent is a co-signer for the PLUS Loan and the loan is a variable interest loan. This is a credit worthy loan and need is not a factor. Payment begins sixty days after disbursement.

**Federal Perkins Loans** — Under this federal program, a student may borrow up to $4,000 each year to a total of $20,000 for an undergraduate program. The student must show a need for financial aid as determined by a financial statement. A maximum of ten years for repayment at 5 percent per annum is required. Payment is made on a quarterly basis after a nine-month grace period.

**Lawrence Tech Emergency Loan Programs** — There are a number of loan programs available to Lawrence Tech students for emergency problems: Through the generosity of the friends and families of Theodore Rogvoy, Ralph Thetreau, Paul Durocher, Frederick Bornman, Marlene Willis Thornton Sweeting, and others, students may borrow up to $200 per semester for books, supplies, room and board, car repairs or other emergency problems.

If the loan is repaid within 90 days, no interest is charged. After 90 days, a five percent interest is charged monthly. Contact the Office of Financial Aid for an application and additional information.

**GRANTS FOR STUDENTS**

**Federal Supplementary Educational Opportunity Grants (FSEOG)** — This federal program awards grants ranging from $100 to $4,000 for students who demonstrate financial need. Students receiving Pell awards have first priority for FSEOG funds.

**Federal Pell Grant** — Maximum grant eligibility for each student is $3,300 annually and is available only for undergraduate students. The application for the Pell Grant, The Free Application for Federal Student Aid (FAFSA) is used to determine the family contribution. The FAFSA is available from the Office of Financial Aid or at www.ltu.edu by searching for the link for FAFSA On The Web.

**WORK-STUDY**

**Federal Work-Study Program** — This program is designed to help students pay for their education by providing them with employment. Students may work on campus in any capacity, including work in academic departments and administrative offices as well as library work, landscaping, and maintenance work. A student must demonstrate financial need to be eligible for the Federal Work-Study program. Federal minimum wage is paid to FWS students.

For information on the Michigan Work-Study program, see “Other Michigan Programs”.

**JOB PLACEMENT SERVICE**

The Career Services Office maintains a list of available part-time and full-time jobs with area businesses and industries. Jobs are posted in a computerized jobs program accessible via campus terminals.

**CO-OP EDUCATION**

The University has a formal co-op program in a variety of formats including alternating semesters, back-to-back, or a parallel system of work and school. Interested students should contact the Cooperative Education Department for more information.

Students in the traditional Co-op program (alternating every other semester between work and school) and receiving some form of financial aid or scholarship, can receive their financial aid award once they return on campus on a full-time basis.

Students on the parallel program can potentially receive financial aid during their Co-op duration provided the student is attending at least half-time (6 credit hours) each semester.

Students should speak with a financial aid counselor though for further information regarding their scholarship, loan or other financial aid package while on Co-op.

Co-op employers include a variety of small, medium, and large organizations. Among these are Ford Motor Company, General Motors Corporation, Lear Corporation, the Michigan Department of Transportation, Nissan Research & Development, Denso, and Siemens.

Informally and apart from the formal co-op program, many students in all disciplines work full or part-time while attending classes. Lawrence Tech’s day and evening course offerings provide considerable flexibility to students who seek concurrent employment. While students may learn of particular job opportunities through such sources as the Career Services Office, students are individually responsible for working out an acceptable attendance schedule with their employer.

**ADDITIONAL FINANCIAL AID INFORMATION**

Application procedures — Financial assistance at Lawrence Tech is granted without regard to an applicant’s race, sex, color, age, handicap, marital status, or national or ethnic origin. The financial aid application procedure for both new and enrolled students interested in state or federal programs is as follows:

A. Contact the Student Financial Aid Office for the Free Application for Student Aid (FAFSA) to apply for federal and state financial aid programs. (This can be done using the FAFSA form or by going to www.ltu.edu and using the link for FAFSA On The Web);
B. Complete the form and mail it as instructed before the published application deadlines;

C. Processing normally takes six to eight weeks. New students are notified of their financial aid awards beginning in April. Returning students are notified of their awards beginning in July.

Basis for awards — Students with the greatest need, as determined by a standard federal methodology, receive first choice of financial aid monies available. Students meeting published application deadlines have preference with financial aid funds.

Basic costs — Personal expenses for room, board, clothing, recreation, laundry, travel, books, and incidentals vary according to individual lifestyle. An estimate for total costs can be made by adding tuition and fees to these items. The Student Financial Aid Office can assist students in arriving at these estimates.

Satisfactory academic progress — All students receiving financial aid are expected to maintain satisfactory academic progress. Undergraduate students receiving any type of financial aid must maintain a grade point average of at least 2.0 after completing the first two semesters, including summer school, or stand the chance of losing their financial aid for the next academic year.

Students are also expected to make normal progress toward graduation. Students who withdraw from more than one-third (1/3) of the courses in which they have enrolled during the year (two semesters including summer school), do not meet standards of progress.

Contact the University’s Financial Aid Office for information concerning the appeal and renewal procedure when standards of progress are not met.

Combined day and evening enrollment — For the purpose of determining full-time enrollment, day and evening classes are calculated together.

Defaulted Student Loans — Students that have defaulted on student loans, or owe a refund on a grant or owe any college tuition will not be eligible for any financial aid until the obligation is fulfilled and monies paid back to the College.

Verification of Financial Statement Information — Lawrence Tech reserves the right to request from its students, Federal IRS 1040, 1040A or 1040EZ income tax information for the entire family for verification of financial information. Students refusing to provide family income tax information may be denied financial aid. For families not filing a federal tax form, other types of verification will be required.

Financial Aid and Credit Hour Reduction — Financial aid may be reduced or canceled if a student takes less than 12 credit hours per semester. Award amounts for need-based financial aid is based on the number of credit hours attempted and a student’s demonstrated financial need. Students planning to drop all or part of their classes should contact the University’s Financial Aid Office to discuss any effect on their financial aid awards.

Auditing Classes — Students who audit classes can NOT receive financial aid for the audited classes.
The policies and procedures described in this Catalog determine the academic status of students enrolled in the University. Exceptions to these policies and procedures may be considered only upon a written request to the Office of the Provost. For policies pertaining to graduate programs, see Lawrence Tech’s Graduate Catalog.

DEFINITION OF FULL-TIME STATUS

Classification as a part-time or full-time student is based upon the weekly academic load which the student carries. Undergraduates are considered full-time when registered for a minimum of 12 credit hours.

GROUPING OF STUDENTS BY CLASSES

Students in undergraduate programs are classified as follows:

<table>
<thead>
<tr>
<th>Semester hours</th>
<th>Freshman</th>
<th>0-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophomore</td>
<td>30-59</td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>60-89</td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>90+</td>
<td></td>
</tr>
</tbody>
</table>

CREDIT HOUR

The University converted from a quarter credit system to a semester system, effective beginning in the Fall of 1994. Work completed prior to August, 1994, is recorded in standard quarter hours. Work completed after August, 1994, is recorded in semester hours. Quarter hours convert to semester hours by multiplying quarter hours using a factor of two-thirds.

GRADING SYSTEM

A record of grade points is kept in the student’s permanent record and used to determine his or her overall scholastic average. The following grades are computed in the grade point average:

<table>
<thead>
<tr>
<th>Grade Points per Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>A-</td>
</tr>
<tr>
<td>B+</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>B-</td>
</tr>
<tr>
<td>C+</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>C-</td>
</tr>
<tr>
<td>D+</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>D-</td>
</tr>
<tr>
<td>F</td>
</tr>
</tbody>
</table>

The grades D, D+, and D- are not used in graduate programs.

The following grades are not computed in the grade point average:

<table>
<thead>
<tr>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>W     Withdrawal</td>
</tr>
<tr>
<td>X     Audit</td>
</tr>
<tr>
<td>CR    Credit</td>
</tr>
<tr>
<td>NC    No Credit</td>
</tr>
<tr>
<td>I     Incomplete</td>
</tr>
<tr>
<td>DG    Deferred Grade</td>
</tr>
<tr>
<td>NR    No Report</td>
</tr>
</tbody>
</table>

RECOMPUTATION OF GRADE POINT AVERAGE

The following grades may be repeated, and the grade point average recalculated, at the undergraduate level: C-, D+, D, D-, and F. The latest attempt must have resulted in a passing grade (D- or higher).

Students must petition the Registrar’s Office to have the grade point average recalculated. Once a degree has been posted, no further recomputation will be made. To be recomputed, the latest attempt must be the same course as the
first and must be part of the University’s normal course offerings. Directed study or special sections may not be used for recomputation purposes. The University does not represent that a course will be offered within the time limits above. Courses may also be deleted from the curriculum and subsequently may not be recomputed. When the recomputation is completed, only the credit hours and grade for the latest attempt will be reflected in the grade point average. The grade for the first attempt will be replaced as follows:

<table>
<thead>
<tr>
<th>Original grade</th>
<th>After recomputation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-</td>
<td>C-R</td>
</tr>
<tr>
<td>D+</td>
<td>D+R</td>
</tr>
<tr>
<td>D</td>
<td>DR</td>
</tr>
<tr>
<td>D-</td>
<td>D-R</td>
</tr>
<tr>
<td>F</td>
<td>FR</td>
</tr>
</tbody>
</table>

Graduate students are not eligible for grade point average recalculation.

INCOMPLETE

A grade of “I” is given only under extraordinary circumstances for coursework which has been of satisfactory quality and, in the judgment of the instructor and the instructor’s dean, adequate to justify a reasonable extension of time. It is assigned only in cases in which the student has completed satisfactorily the major portion of the course requirements. It is not given to a student who is already doing failing work. Students receiving an “I” may not attend the class during a succeeding semester, unless they register for the class.

GRADE CHANGES

The electronic entry of grades submitted by instructors at the end of each semester is the official record of grades. Grade changes, when necessary, are done by the instructor with approval of the department chairman and dean. The registrar may determine that the provost’s approval is also required in exceptional or unusual circumstances.

Any disputes concerning grades must be resolved within one semester after the course was completed. Failure to receive grades by mail does not exempt students from the one semester limitation on grade changes.

AUDITING CLASSES

Anyone wishing to audit a course must submit an audit request form along with the regular registration forms. These forms are available in the Student Service Center. Starting with the first day of classes, a student may not change enrollment status from audit to credit or from credit to audit. Full tuition is charged and the tuition credit policy applies if the student withdraws.

WITHDRAWAL FROM CLASSES

When intending to partially or completely withdraw from courses, it is the student’s responsibility to notify the Registrar’s Office in writing. Drop-add forms may be obtained from the Student Service Center. The date of withdrawal will be the date the Registrar’s Office receives the completed drop-add form from the student. When the registrar receives the drop-add form, a signed and dated copy is returned to the student and should be retained by the student for purposes of record. Students unable to appear in person may give notice of withdrawal by certified mail addressed to the Registrar’s Office. The postal cancellation date is used to determine the date of the withdrawal.

Drops will not be accepted by telephone. Within certain time limits, tuition adjustments may be made. See the Tuition and Fees section of this Catalog.

GRADES FOR COURSES DROPPED

Students who withdraw from a course before the 13th week of the Fall or Spring semester will receive the “W” grade. The last day to withdraw from Summer semesters and short courses within the regular Fall and Spring semester is adjusted for the shorter time period as follows:

<table>
<thead>
<tr>
<th>Semester Length</th>
<th>Must withdraw Before</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 weeks</td>
<td>4th week</td>
</tr>
<tr>
<td>6 weeks</td>
<td>5th week</td>
</tr>
<tr>
<td>7.5 weeks</td>
<td>6th week</td>
</tr>
<tr>
<td>10 weeks</td>
<td>8th week</td>
</tr>
</tbody>
</table>

After these dates, students will receive a grade (not a “W”) as determined by the instructor. All withdrawals or “drops” must be initiated by student action to assure that a “W” will appear on the master grade roster and subsequent transcripts. Faculty may not initiate withdrawal procedures nor may they submit a “W” on the electronic grade entry.

Withdrawal schedules for each semester may be obtained in the Student Service Center.

SCHEDULE OF CLASSES

Programs for regular students are outlined in this Catalog. Class schedules giving the days and the hours of the various classes are made available during registration for each semester from the Registrar’s Office or from the on-line version.

CHANGE OF CLASS SCHEDULE

Beginning with the first day of classes, students may change their schedule by use of the drop-add form. An advisor’s signature is required to add a course.

The student is responsible for submitting drop-add forms directly to the Registrar’s Office, and retaining the validated receipt. Classes must normally be added prior to the third week of the semester. All drops and/or adds are effective on the date the Registrar’s Office receives and validates the drop-add form.

ABSENCES

Class attendance records of students are kept by all members of the faculty. The consequences of absenteeism will be determined by the instructor and will reflect his/her policy and judgment with respect to the effect of absenteeism on the student’s final grade.
ACADEMIC REGULATIONS

PREREQUISITES

Students are responsible for successfully completing prerequisites listed in this Catalog for all courses in which they are registered. In those exceptional circumstances where a prerequisite may be waived, it must be done in writing only by the department head or dean of the department or College offering the course. No one else is authorized to waive a prerequisite under any circumstances.

A student who is determined to have enrolled in a course without required prerequisites or an authorized waiver, may be required to withdraw at any time during the semester and will forfeit tuition and fees according to the normal University tuition credit policy.

MID-TERM STATUS

The University pays close attention to the academic progress of students through their course work. An examination of a student’s record occurs during the midway point of the semester. Students having difficulty in courses are encouraged to seek assistance early from the faculty member teaching the course or to take advantage of the wide range of tutorial and other assistance available through the Dean of Students.

GRADE REPORTS

Semester-end grades are sent to all students.

ELECTRONIC COMMUNICATIONS/“STUREG”

All students are required to obtain and maintain university computer accounts while they are enrolled for classes at Lawrence Tech, and are expected to review their electronic mail files on a regular basis. Electronic mail is considered a formal channel of communication and is used for official notices and University business. These accounts are provided without charge to registered students. Devices to access them are provided throughout campus or they may be accessed off-campus through modems. Students may communicate directly with faculty, staff and administrators through campus e-mail.

Lawrence Tech’s convenient, terminal-based student registration system, StuReg, is available each semester for returning students. Using StuReg, currently enrolled students in good academic standing may register themselves from the campus computer laboratories or off campus via modem. StuReg becomes available on a windowed basis with seniors and graduate students allowed first access. After one week of windowed access, StuReg normally remains open to all current students through late registration. Advising clearance is always required, and financial clearance is also required after the first few weeks of each registration. Further details are available each semester from the Registrar’s Office.

ACADEMIC PROBATION

Failure to Make Academic Progress. Any student whose overall grade point average falls below 2.00 at the end of a semester will be placed on academic probation. Students on academic probation are required to have an advisor’s signature to register or to add or drop any class.

Academic Suspension and Dismissal. Any student whose cumulative grade point average remains below 2.0 at the end of two consecutive semesters of their enrollment (excluding summer semesters), or any student on academic probation who fails to meet the requirements of that probation, will be suspended from the University for a minimum of one calendar year. Veterans who do not meet the aforementioned requirements will lose their university certification for V.A. benefits. Engineering and architecture students are also subject to the continuation requirements as described on the next page.

At the end of the designated suspension period, undergraduate students who have been suspended from the University for academic reasons may submit a written petition for readmission to the chair of the Academic Standing Committee. This petition should be received six weeks before the first day of class for the semester in which the student wishes to return.

Students dismissed from a program but not from the University may apply for admission to another program. Students who have been suspended and subsequently readmitted who fail to meet the conditions of their readmission will be dismissed from the University. Students dismissed from the University under these circumstances may not be readmitted.

The University will not accept transfer credit for courses taken at another college or university during a period of one calendar year following suspension.

Excessive Repeating and Withdrawal. Students are expected to successfully complete all the courses in which they are registered and are encouraged to plan their schedules to avoid overloads and conflicts which would interfere with that objective. Any student who engages in excessive withdrawal from classes or who repeats a required course more than once is subject to academic review and may be placed on academic probation regardless of the overall grade point average. Subsequent continuation of this behavior may result in suspension or dismissal. Circumstances demonstrably beyond the student’s control will excuse him/her from this requirement, but poor scholarship will not.

Failure to Complete Lower Division General Education. Lower Division (freshman and sophomore) General Education requirements are expected to be completed before entering the junior year (60 or more semester credits). Juniors who have not completed Lower Division General Education are required to register for these courses each semester concurrently with upper division (junior/senior) courses until the requirements are met.
Students who earn 90 semester credits without completion of Lower Division General Education requirements will be placed on academic probation regardless of the grade point average, and they will not be permitted to register for courses in their major until these requirements are met.

CONTINUATION REQUIREMENTS

Architecture Upper Division Requirements. Architecture students must have a minimum grade point average of 2.3 when they first reach 60 or more semester credits in order to enroll in junior level courses in the College of Architecture and Design. Should an architecture student not meet this requirement, the student must repeat courses in which a grade of “C-” or lower was earned or otherwise improve the grade point average to meet the requirement.

No more than two “D” grades (D+, D, or D-) or one grade of D+, D, or D- in an architecture course may be counted toward an architecture degree.

The College of Architecture and Design requires that students in the B.F.A. in architecture imaging degree program earn a minimum grade of “B-” (2.7) in each architectural imaging studio course in the sophomore, junior, and senior year of the program. These courses may be repeated up to two times in order to improve performance. (Only grades of “C-” or lower may be recomputed.) Failure to satisfy this requirement will lead to suspension from the B.F.A. degree program. In addition to specific requirements for repeating courses, all courses in the College of Architecture and Design with earned grades of “C+” or lower may be repeated by a student in order to enhance learning and improve the cumulative GPA. Courses may be repeated up to two times to improve performance, with grades of “C-” or lower being eligible for recomputation.

Engineering Upper Division Requirements. Engineering students must have a minimum grade point average of 2.00 when they first reach 60 or more semester credits. Any engineering student with 60 or more semester credits whose grade point average falls below 2.00 will be dismissed from the College of Engineering.

Transfer Students in Architecture/Engineering. Provided they meet other requirements and prerequisites, transfer students entering with 60 or more semester credits will be admitted to junior level courses on the same basis as other Lawrence Tech students.

PROBATION AND DISMISSAL POLICIES (GRADUATE/PROFESSIONAL)

For information on policies pertaining to graduate students, see Lawrence Tech’s Graduate Catalog.

ACADEMIC STANDING COMMITTEE/READMISSION

Undergraduate students who have been suspended from the University because of poor scholarship may, after one calendar year, submit a written petition for readmission to the chairperson of the Academic Standing Committee. This petition should be received six weeks before the first day of class of the semester in which the student wishes to return.

Evidence of planning, curriculum load, and work activities are taken into consideration when reviewing petitions for readmission. Petitions should be well organized, typed, and should include the student’s current address, phone number, student number, curriculum, and reasons why the student had previous academic difficulty and why the student now feels he or she can be successful if readmitted.

The petition may include a letter from an employer attesting to competent work and maturity. An official transcript of courses taken at another institution must be submitted at the time the student applies for readmission. However, credit is not allowed for any work taken at another institution for the period of one calendar year following suspension. Once admitted, a student is required to abide by the catalog graduation requirements.
at the time of readmission. A student’s requirement for graduation may be subject to reevaluation.

Students wishing to reapply to a graduate or professional degree program after having been suspended must make a regular application for admission.

ENROLLMENT AT OTHER INSTITUTIONS

Students enrolled at Lawrence Tech may not take courses at other colleges or universities during concurrent semesters or Summer session and expect those credits to transfer to Lawrence Tech without the prior written permission of the Credit Review Committee. Students should submit their requests for such permission to the Registrar. Generally, students should allow one month for processing. Courses taken in violation of this policy will be denied transfer credit. A grade of 2.0 in each course is required for transfer.

Students are expected to complete all courses for a Lawrence Tech degree at the University once they have been admitted. Transfer credit is generally not given for courses taken at other institutions after enrollment at Lawrence Tech, unless those courses cannot be completed at the University.

HONOR ROLL (DEAN’S LIST)

In recognition of students who achieve superior scholastic records, a Dean’s List is published at the close of each semester, and an appropriate notation is made on students’ records. This includes all students who have carried a minimum of twelve credit hours and have earned a grade point average of 3.50 or higher.

Part-time students must complete two semesters with at least 6 credit hours each semester, with a minimum GPA of 3.50 to be included on the honor roll.

RECORDS (Transcripts)

A permanent record of all credits earned at or transferred to the University is maintained for each student in the Office of the Registrar. These records are preserved indefinitely. All graduates are mailed a free copy of their academic record at Lawrence Tech as soon as possible after the degree is reflected on the record, providing financial obligations to Lawrence Tech have been settled by that date.

At all other times, a nominal charge is made for all official copies of a student’s record at Lawrence Tech. Copies of records (transcripts) will not be released without the student’s authorization in writing. Transcripts will not be issued unless all financial obligations from prior semesters have been settled.

STAR (Student Academic Record) PROGRAM

Lawrence Tech students may access their unofficial transcript (STAR report) and account information through the STAR program. Access is controlled by student account password and Social Security number.

Students who entered Lawrence Tech in the Fall of 1994 or later may also use the Degree Audit Reporting System (DARS). DARS provides a degree audit report which relates course work earned and in progress to the total degree program.

ARCHITECTURAL DRAWINGS AND REPORTS

Architecture students are advised that all two and three dimensional drawings and models, as well as reports and other written studies submitted in satisfaction of any required or elective courses become the property of the University, and may be kept or returned at the sole discretion of the dean of the College of Architecture and Design. When such work is kept, arrangements will be made for the student to receive suitable photographic copies as a record of his design work. Whenever any student work is exhibited or published, the student will receive proper acknowledgment of his or her efforts.

INSPECTION OF RECORDS/ FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT OF 1974

Lawrence Technological University intends to comply fully with the Family Educational Rights and Privacy Act of 1974. This Act was designed to protect the privacy of education records, to establish the right of students to inspect and review their educational records, and to provide guidelines for the correction of inaccurate or misleading data through informal or formal hearings.

Students also have the right to file complaints with the Family Educational Rights and Privacy Act Office concerning alleged failures by the University to comply with the Act.

University policy explains in detail the procedures used for compliance with the provisions of the Act. Copies of the policy are kept on file in the Registrars Office. Requests for information relating to the foregoing should be addressed to the Office of the Registrar at Lawrence Technological University.
Lawrence Technological University offers curricula leading to the following degrees and certificates. (For information on graduate degrees, please see the Graduate Catalog):

**Certificate**
- Cooperative Education - Engineering
- Cooperative Education - Technology
- Information Technology
- Technical Communication
- Web and Electronic Commerce

**Associate of Science**
- Chemical Technology
- Construction Engineering Technology
- Electrical Engineering Technology
- Manufacturing Engineering Technology
- Mechanical Engineering Technology
- University Studies

**Bachelor of Fine Arts**
- Architectural Imaging
- Bachelor of Interior Architecture
- Bachelor of Science Administration
- Bachelor of Science Architecture
- Bachelor of Science Business Administration*
- Bachelor of Science Chemistry
- Bachelor of Science Civil Engineering
- Bachelor of Science Computer Engineering
- Bachelor of Science Computer Science
- Bachelor of Science Construction Management
- Bachelor of Science Electrical Engineering
- Bachelor of Science Engineering Technology
- Bachelor of Science Environmental Chemistry
- Bachelor of Science Humanities
- Bachelor of Science Industrial Management
- Bachelor of Science Information Technology
- Bachelor of Science Mathematics
- Bachelor of Science Mathematics and Computer Science
- Bachelor of Science Mechanical Engineering
- Bachelor of Science Physics
- Bachelor of Science Physics and Computer Science
- Bachelor of Science Technical Communication
- Bachelor of Science Technology Management

**Master of Automotive Engineering**
- Master of Business Administration
- Master of Civil Engineering
- Master of Science Education
- Master of Science in Computer Science
- Master of Science in Industrial Operations
- Master of Science in Information Systems
- Master of Science in Technical Communication
- Master of Engineering in Manufacturing Systems
- Certificate in Manufacturing Systems

*(currently enrolled students only)*

**HONORS PROGRAM**

High-achieving students are invited to participate in the University Honors Program. Individual departments at Lawrence Tech offer honors course work, either in stand-alone honors courses, regular courses with an “honors option,” or special sections of standard courses. The accumulation of sufficient honors credit through the completion of honors course work leads to the distinction of graduating “with honors.” This distinction is noted on the student’s transcript and diploma.

The Honors Program has been created to:
- serve and challenge high-achieving students,
- enhance the intellectual and social climate for high-achieving students,
- encourage students to enhance and diversify their college experience by taking courses, including interdisciplinary projects, beyond the requirements of their majors,
- develop students’ leadership potential through academic achievement and service to the University and the community.
DOUBLES MAJORS

Students who want to broaden and enhance their education have the opportunity to earn majors in two areas in a reasonable time frame. In order to earn a double major, students simply complete all of the course requirements for both majors. Because of overlapping core course requirements and open electives in both majors, a double major can be earned, for example, in mathematics and humanities, with as few as 135 credit hours. The number of credit hours required varies depending on the choice of majors.

Interested students are encouraged to consult the department chairs of the two majors being considered. Careful planning and course scheduling will facilitate the completion of both majors in the shortest time.

SIMULTANEOUS ENROLLMENT

Students may be simultaneously enrolled in appropriate associate’s degree and bachelor’s degree programs. Typical combinations are:

- A.S. in Engineering Technology/B.S. in Technology Management
- A.S. in Engineering Technology/B.S. in Engineering Technology
- A.S. in Chemical Technology/B.S. in Chemistry

REQUIREMENTS FOR GRADUATION

The University reserves the right to modify its graduation and other academic requirements as may seem necessary from time to time. It is obligated only during the academic year of the student’s registration by requirements published in the Catalog for that year.

Statement on General Education. Lawrence Technological University is a focused, technologically oriented university which places emphasis on preparing students for careers in management, engineering, technology, architecture and design, computer science, science, the humanities, communication, and mathematics. Underlying specific program objectives is a principle that all graduates of the University, regardless of their major area, should receive a liberal education which prepares them to contribute as citizens and enlightened professionals.

The undergraduate General Education Requirements insure that students interact with students and faculty in program categories other than their major and obtain both breadth and depth in the humanities, social sciences, mathematics and analysis, and the natural sciences, consistent with the basic educational philosophy of the University.

These requirements are summarized by six basic statements which apply to all baccalaureate curricula:

1. All graduates must be literate and skilled in communication including basic English composition and specialized communication appropriate to their individual major programs;
2. All graduates must be aware of the diverse basis of our culture and must demonstrate both breadth and depth in an area of the arts and humanities;
3. All graduates must be aware of the foundations of our society and the development of social issues;
4. All graduates must be aware of the scientific understanding of the natural world, including laboratory experience;
5. All graduates must have analytical skills consistent with the technological focus of the University, including mathematics through basic calculus and the use of computers in their major fields;
6. All graduates must have a cohesive major program which integrates their basic education with both theory and practical applications in an area of interest to the University faculty.

Curriculum requirements for all four-year undergraduate majors: Students who enter the University as freshmen (less than 30 hours of transfer credit) seeking a baccalaureate degree, must satisfy the general education requirements through completion of the following course sequences. (Students who transfer to Lawrence Tech with more than 30 semester hours should follow the general education transfer procedures in the Admissions section of this Catalog.) The credits shown are the minimum required to satisfy requirements in a category.

Communications

- English Composition......... 3 sem cr
- Professional and Technical Communication........... 3 sem cr

Humanities and Social Sciences

- World Masterpieces........... 6 sem cr
- Foundations and Development of the American Experience.................. 6 sem cr
- Additional Social Science Elective or course specified for a major....... 3 sem cr
- Junior or Senior Level Elective.................. 3 sem cr
- Minimum Communications, Humanities, Social Sciences.................. 24 sem cr

Natural Science

- Two semesters of Natural Science courses ............ 6 sem cr
- Science Laboratory........... 1 sem cr

Mathematics and Analysis

- Mathematics through Basic Calculus................. 7 sem cr
- Demonstration of competency in use of the computer in the major field
- Minimum Science and Mathematics........ 14 sem cr
- Minimum Total General Education........ 38 sem cr
DEGREES AND GRADUATION

Associate degrees are awarded to candidates who have fulfilled the following requirements:

- Satisfactory completion of all requirements in one of the associate degree programs.
- Any student required to take Basic Studies courses (course level zero) will receive credit hours and grade points for such courses. The hours so earned, however, will be added to the total hours required for graduation.
- Attainment of a minimum grade point average of 2.00 in all credit hours earned at Lawrence Technological University.
- Completion of the last two semesters of work for a degree (minimum of 24 credit hours) at Lawrence Tech. Twelve hours of this work must be in the specialty courses of the chosen curriculum.
- Submission of a Petition for Graduation approximately one year but no later than March 1 preceding the date of expected graduation. A new petition must be submitted in the event requirements for graduation are not completed before the end of the Summer Term immediately following the academic year.
- Full payment of all financial obligations to the University.

Diploma honors will be granted to the recipients of an associate degree on the basis of the graduate’s record as established at Lawrence Tech. Only courses taken at the University qualify for honor point credits. The words Cum Laude are inscribed on the diploma provided the graduate has earned a grade point average of at least 3.25. The words Magna Cum Laude are inscribed if the graduate has earned a grade point average of at least 3.50. The words Summa Cum Laude are inscribed if the graduate has earned a grade point average of at least 3.75. A transfer student must have completed a minimum of 30 semester hours at Lawrence Tech to be eligible for diploma honors.

Bachelor of Science and Bachelor of Fine Arts degrees are conferred upon candidates who have fulfilled the following requirements:

- Satisfactory completion of a major curriculum as set forth in the Catalog. Any student required to take Basic Studies courses (course level zero) will receive credit hours and grade points for such courses, but the credit hours earned for these Basic Studies courses will not be included in the total hours required for graduation.
- Attainment of a minimum grade point average of 2.00 in all credit hours earned at Lawrence Technological University.
- Completion of the last two semesters of work (minimum 30 hours) for a degree at Lawrence Technological University, a minimum of 14 hours of this work being in the student’s major;
- Submission of a Petition for Graduation approximately one year but no later than March 1 preceding the date of expected graduation. A new petition must be submitted in the event requirements for graduation are not completed before the end of the Summer Term immediately following the academic year;
- Full payment of all financial obligations to the University.

The minimum expectation for the successful completion of art, architecture and interior design studio course work in the College of Architecture and Design necessitates that for every hour of in-class studio time per week, an equal amount of course hours of outside work be devoted to the accomplishment of studio and studio related course projects and assignments.

Technical and non-technical electives appropriate for each curriculum will be defined by the major departments concerned. They will also define the permissible distribution of these electives among humanities, the student’s major field, cognate fields and others.

Diploma honors will be granted to the recipients of a baccalaureate degree on the basis of the graduate’s record for all course work in the degree program at Lawrence Tech. Only courses taken at the University qualify for honor point credits. The words Cum Laude will be inscribed on the diploma provided the graduate has earned a grade point average of at least 3.25. The words Magna Cum Laude will be inscribed if the graduate has earned a grade point average of at least 3.50. The words Summa Cum Laude will be inscribed if the graduate has earned a grade point average of at least 3.75. A transfer student must have completed a minimum of 60 semester hours at Lawrence Technological University to be eligible for diploma honors.

COURSE NUMBER AND LEVEL

On the pages of course descriptions which follow, each course is identified by an alphanumeric course number. The alphabetic prefix represents the subject area.

College of Architecture and Design

Architecture.........................ARC
Imaging and Graphic Design.....................ART
Interior Architecture/Design.....................ARI

College of Arts and Sciences

Accounting..........................ACC
Biology...............................BIO
Botany..................................BOT
Chemistry..............................CHM
Communications........................COM
English as a Second Language..................ESL
Finance..................................FIN
Geology.................................GLG
Human Resource Management....................HRM
Language and Literature......................LLT
Management...........................MGT
Management Information Systems................MIS
Marketing..............................MKT
Mathematics and Computer Science/Math Co-op.........MCS
Operations Management.......................OPM
Physical Science.......................PSC
Physics.................................PHY
Psychology..............................PSY
Science Education.........................SCE
Social Science..........................SSC

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DEGREES AND GRADUATION

College of Engineering
Civil Engineering......................ECE
Construction Engineering
Technology............................TCE
Electrical and Computer Engineering.............................EEE
Electrical Engineering
Technology............................TEE
Engineering Co-Op....................ECO
General Engineering....................EGE
Manufacturing Engineering
Technology............................TIE
Mechanical Engineering..................EME
Mechanical Engineering
Technology............................TME
Technology Co-Op.....................TCO
Technology Operations
Management............................TOM

College of Management
Accounting............................ACC
Finance.................................FIN
Human Resource
Management............................HRM
Information Technology.............INT
Industrial Operations................MIO
Management............................MGT
Management Information
Systems.................................MIS
Marketing..............................MKT
Operations
Management............................OPM

The first number following the alpha prefix indicates the academic level of the course: 0 = Basic Studies, 1 = Freshman, 2 = Sophomore, 3 = Junior, 4 = Senior, 5 = Senior/Grad, 6 and above = graduate level. Basic study courses (course level zero) normally do not provide degree credit. The last of the four numbers normally indicates the semester hours of credit assigned to the course. For example, ARC4653 carries three hours credit.

MARCH 1 PETITION FOR GRADUATION DEADLINE

As noted under the preceding section, Requirements for Graduation, Petitions for Graduation must be submitted no later than March 1 of the year of expected graduation. Processing of petitions after that date, if approved, requires that a substantial special processing fee be assessed to the student. Further, availability of caps, gowns, and diplomas in time for commencement cannot be guaranteed.

A graduation fee is charged, and is refundable in the event the student does not complete requirements as planned.

Students who petition to graduate and do not complete requirements within the same academic year must petition again for a subsequent year. This is the student’s responsibility.

CATALOG OF ENTRY — LIMITATIONS

Although graduation requirements of the University may change while a student is enrolled, students are normally expected to meet the graduation requirements outlined in the Catalog that is in effect at the time they matriculate, as long as the courses are still offered by the University.

Substitutions may be made for required courses that may no longer be available.
However, if the new graduation requirements may be adapted to a student’s current course of study without increasing his or her credit hour requirements or existing prerequisites, the new requirements shall prevail.

Students interrupting their studies for three calendar years or more must reapply for admission (see Admission section, Interruption of studies). If readmitted, the Catalog in effect at the time of readmission is used to determine graduation requirements.
About the College of Architecture and Design

The College of Architecture and Design at Lawrence Technological University is among the 30 oldest schools of architecture in the United States. It was founded on the conviction that universal truths underlie all existence and provide the scientific and aesthetic foundation for the study of architecture as it relates to the service of humankind. These incorporate technology, the physical and social sciences, the arts, economics, and law.

Above all, Lawrence Tech’s architecture curricula emphasize the human condition and focus on humankind as the primary beneficiary of all artistic and technological endeavors.

No single architectural style or philosophy, other than the pursuit of excellence in the
The curricula of the College of Architecture and Design. To this end, the faculty are drawn from a broad spectrum of creative and technical backgrounds. Not only does this maximize the students’ exposure to a variety of differing philosophies and ideals, but it also offers the student contact with respected practicing professionals who are leaders in their fields of endeavor.

Obviously, architecture cannot be created in isolation. Its full success depends on its supportive harmony with all creative disciplines. Therefore, Lawrence Tech emphasizes the study of an architecture which recognizes the interrelationship of technical, economical, social, environmental, and philosophical factors; and the College rejects any isolated or unilateral science, philosophy, or art which inhibits the full development of a student’s skills and ideals. Lawrence Tech educates architects who are well prepared for the complex demands dictated by contemporary society.

The curricula of Lawrence Tech’s College of Architecture and Design are structured in three undergraduate programs, a 36-credit Master of Architecture professional degree program, and a post-professional degree program in architecture.

Students are cautioned that course selection approval at the time of registration is based on stated prerequisite requirements and the student’s ability to maintain adequate academic progress in collateral courses as indicated in the respective curriculum outlines.

A master plan of studies and design methods, recognized as an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes two types of degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

Masters degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

BACHELOR OF SCIENCE DEGREE PROGRAMS IN ARCHITECTURE, BACHELOR OF INTERIOR ARCHITECTURE, AND BACHELOR OF FINE ARTS IN ARCHITECTURAL IMAGING

These programs are unique in their emphasis on the relationship of all the disciplines that influence architecture.

All studies creatively integrate the sciences, humanities, and technologies with the design process. Each year’s design studios build on course work previously assimilated, and all studio courses must be completed in strict sequential order. In broad terms, the programs are rooted in the rational subjective mastery of basic knowledge, the development of intuitive skill, and the maximization of the student’s social and environmental awareness.

Year one is a foundation and introduction into the world of creativity, design and representation together with general education courses and specialized communications. Year two is a discovery of the integration of cultural awareness and the creative world of architecture through liberal studies and design methods, concepts and theories. In year three there is an exploration of thought and design philosophy through technological, analytical and conceptual integrations. Year four is an integration by the individual student of all previous design issues, and an opportunity for topic concentration through elective studios.

BACHELOR OF SCIENCE IN ARCHITECTURE

The Bachelor of Science in architecture degree program is designed to provide a broad foundation for the development of social and environmental awareness, problem-solving ability and design creativity. This four-year preprofessional program prepares students for entry to a professional degree program for which high standards in academic performance will be required.
BACHELOR OF INTERIOR ARCHITECTURE

The Bachelor of Interior Architecture degree program prepares people for careers in interior architecture and design through placing value and emphasis on technical, social, psychological, cultural, environmental, economical, spiritual, and physical factors to comprehensively respond to human needs. The program is integrated with the undergraduate programs in architecture and architectural imaging providing students opportunity to experience the interrelationships among disciplines and the ability to examine a variety of design theories and philosophies. Critical thinking and creativity are important in the development of the person as well as the professional and are emphasized throughout the curriculum.

BACHELOR OF FINE ARTS IN ARCHITECTURAL IMAGING

The Bachelor of Fine Arts in architectural imaging degree program combines a comprehensive concentration on course work in the fine arts, illustration and computer technology with the strengths of the preprofessional degree program in architecture. The B.F.A. in architectural imaging degree program is the first of its kind in the United States. It is based on a broad foundation in visual communications and personal experience in appropriate technologies. Objectives are to educate highly skilled, creatively aware design professionals capable of dealing with a complete visual communications spectrum, to promote the study and advancement of architectural imaging and its allied fields, and to promote understanding and cooperation between architectural illustrators and all design professionals.

An Open Drawing Studio meets for three hours once a week and affords an opportunity for all architecture, interior design and architectural imaging students to sharpen their drawing abilities working from live models and creative drawing projects.

DUAL DEGREES

Students may earn two of the three separate degrees — the B.S. in architecture, Bachelor of interior architecture or B.F.A. in architectural imaging — in as few as five years by carefully preplanning course work. Qualified dual degree students may also earn a graduate degree, in addition to the dual degrees in a total of seven years through the careful structuring of course work and consultation with the dean of architecture. Students desiring dual degrees in architecture/interior architecture/architectural imaging must consult with the program directors in the freshman year for assistance in properly sequencing course work.

Dual degree status within the College of Architecture and Design can be granted only by following the procedure outlined in the most recent edition of the “Dual Degree Program” policy statement, which is available from the chair of the Department of Art & Design. In order to be a dual degree candidate, students must meet the chair early in the freshman year. Students must meet the minimum GPA requirements, and have filed a “Dual Degree Declaration” form with the chair of the Department of Art & Design.

MASTER OF ARCHITECTURE PROFESSIONAL DEGREE

The 36-credit M. Arch. graduate degree program meets the academic credentials for professional licensing in the field of architecture established by the National Architectural Accrediting Board (NAAB). A thesis is the focus of the program and is followed by the Master Class, taught by visiting professionals.

In addition to the thesis and master class studios, required courses include research methods, environmental issues, architectural theory, professional practice, advanced liberal education courses and elective offerings available only to M.Arch. students.

The program emphasizes leadership qualities for future architects who may work in team orientations in professional practice or pursue non-traditional practice.

For detailed information on the graduate programs, see the Graduate Catalog.
BACHELOR OF SCIENCE IN ARCHITECTURE
Total Semester Credit Hours: 132

FRESHMAN YEAR

FIRST SEMESTER

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NOTES: ARC4183, Twentieth Century Architecture, is strongly recommended for all candidates for the M.Arch. professional degree program.

Students pursuing a dual degree (architecture/interior, architecture/architectural imaging, architectural imaging/interior) must consult the program director to schedule coursework. Dual degree status requires following the procedure outlined in the most recent edition of the Dual Degree Program policy statement, available from the Chair, Department of Art & Design. To be official dual degree candidates, students must file a Dual Degree Declaration form with the Chair of the Department of Art & Design.

See your academic advisor for elective requirements and further specific information on your degree program.

ARCHITECTURE ADVISORS:
David M. Chasco, ext. 2815, VAX Username: CHASCO, room A209
Neville Clouten, ext. 2805, VAX Username: CLOUTEN, room A116
Nancy McCurdy-Fearon, ext. 2819, VAX Username: MCCURDY, room A112
Betty-Lee Seydler-Hepworth, ext. 2808, VAX Username: SEYDLER, room A115
# Bachelor of Fine Arts in Architectural Imaging

**Total Semester Credit Hours: 133**

## Freshman Year

### First Semester

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<tr>
<td>ARC2813</td>
<td>Electronic Meth 1</td>
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<tr>
<td>ART3023</td>
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## Senior Year

<table>
<thead>
<tr>
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<tr>
<td>ART4233</td>
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<td>ART4512</td>
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<tr>
<td>MGT2113</td>
<td>Intro to Bus Law</td>
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<td>ARC4203</td>
<td>Graphics Systems</td>
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<td>ART3213</td>
<td>Sculpture</td>
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<td>ART3323</td>
<td>Portfolio Design</td>
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</table>

**NOTES:**
- Of the four elective courses required for the B.F.A. in architectural imaging, two must be an architecture elective — any three credit hour courses beginning with ARC, ART or ARI, except for required courses.
- An elective with four or more credit hours will count as only three credit hours toward the elective requirement.
- Architectural imaging students pursuing either dual degree option (AI/IA, IA/AR) must consult with the Chair, Department of Art & Design.
- See your academic advisor for elective requirements and further specific information on your degree program.

**Architectural Imaging Advisor:**
Gretchen Maricak, ext. 2878, VAX Username: MARICAK, room A213
BACHELOR OF INTERIOR ARCHITECTURE  
**Total Semester Credit Hours:** 133

### FRESHMAN YEAR

#### FIRST SEMESTER
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<tr>
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<td>COM1103</td>
<td>English Comp</td>
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<tr>
<td>SSC2413</td>
<td>Found Am Exper</td>
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<td>MCS/SSC/LLT/ARC1133</td>
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<tr>
<td>ARC1213</td>
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Total: 16 Cr. Hrs.

#### SECOND SEMESTER
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Total: 18 Cr. Hrs.

### SOPHOMORE YEAR

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<td>ARC3613</td>
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<td>ARC2117</td>
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Total: 17 Cr. Hrs.

### JUNIOR YEAR

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<td>ARC2313</td>
<td>Building Sys 1</td>
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<td>ARC3633</td>
<td>West Trad of Art</td>
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<td>ARI3115</td>
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Total: 17 Cr. Hrs.

### SENIOR YEAR

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<td>ARI4143</td>
<td>Advanced Lighting</td>
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<tr>
<td>ARI4112</td>
<td>History of Furniture</td>
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<td>ARI4223</td>
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<tr>
<td>Arch Electives</td>
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Total: 17 Cr. Hrs.

### NOTES:  
Both electives required for the Bachelor of interior architecture must be architecture electives — any three credit course beginning with ARC or ART, except those required in the Bachelor's program of IA. A course with four or more credit hours counts as only three credit hours toward the elective requirement. The remaining elective must be a three credit, junior or senior level LLT/SSC/PSY course.

Students pursuing a dual degree (IA/AR, IA/AI, AI/AR) must consult the chair, Department of Art and Design.

See your academic advisor for elective requirements and further specific information on your degree program.

### INTERIOR ARCHITECTURE ADVISOR:  
Virginia North, ext. 2848, VAX Username: NORTH, room A151
PRE-COLLEGE COURSES

The pre-college program invites exceptional high school juniors and seniors (with a “B” average or better) to explore the many facets of a career in architecture, interior design, or illustration. Guest lectures by artists and architects supplement studio classes in basic design and visual communication. Upon completion with a “C” or better, these courses transfer as college credit for possible advanced placement in the B.S. in architecture, interior architecture, or B.F.A. in illustration programs.

ARC0113 Basic Design 3
ARC0213 Visual Communication 3

UNDERGRADUATE COURSES

ARC1000 ART/ARCHITECTURE AWARENESS
Prerequisite: 0. Survey of two- and three-dimensional expression in art and architecture with related theory and history. Guest lecturers from the arts, architectural, engineering, and cultural communities. (A sequence of two courses begins in September. Portions of the courses will meet during the day, evening, and occasionally on Saturdays throughout the year. Attendance during all sessions is required to satisfy degree requirements.) Lect. 1 hr. 0 hours credit

ARC1002 ART/ARCHITECTURE AWARENESS
Prerequisite: ARC1000. Continuation of ARC1002. Lect. 1 hr. 2 hours credit.

ARC1113 BASIC DESIGN
Prerequisite: 0. Observation, analysis, and application of visual imagery and the principles and elements of design in the creation of two-dimensional, achromatic, design compositions using dry media. Principles include: balance, rhythm, repetition, gradation, structure, transparency, texture, contrast and proportion. Introduction to design methodology and visual/verbal techniques necessary for design conceptualization and presentation. Studio 6 hrs. 3 hours credit.

(Upon successful completion, with a grade of “C” or better, this course will transfer into Lawrence Tech’s undergraduate programs in place of ARC1113 Basic Design.)

ARC1133 BASIC DESIGN 2
Prerequisite: ARC1113. Observation, analysis, and application of visual imagery and the principles and elements of design in the creation of three-dimensional compositions. Form and spatial enclosure; color, light and illusion; modularity and modulation; and an introduction to basic concepts of structural and sculptural forms. Further instruction in visual/verbal skills. Studio 6 hrs. 3 hours credit

ARC0213 VISUAL COMMUNICATION
Prerequisite: 0. Development of basic skills in the use of techniques for architectural drafting and sketching, including two-dimensional graphics, perspective, shades and shadows, model construction, and basic delineation. Studio 6 hrs. 3 hours credit.

(Upon successful completion, with a grade of “C” or better, this course will transfer into Lawrence Tech’s undergraduate programs in place of ARC1213 Visual Communications.)
ARC1213 VISUAL COMMUNICATIONS 1
Prerequisite: 0. Development of basic skills in the use of techniques for architectural drafting and sketching, including two-dimensional graphics, perspective, shade, and shadow, model construction, basic delineation, and drawing from observation. Introduction to methods of freehand drawing, developing skills to be used in perspective sketching and rendering. Studio 6 hrs. 3 hours credit.

ARC1223 VISUAL COMMUNICATIONS 2
Prerequisite: ARC1213. Enhancement of freehand skill and techniques in pursuit of rendering three-dimensional form and space on a two-dimensional field. Realistic depiction of subject material is developed through comprehensive understanding of one-and two-point perspective with particular emphasis on color, light, shade-shadow, texture, and composition. Studio 6 hrs. 3 hours credit.

ARC2117 INTEGRATED DESIGN STUDIO 1
Prerequisites: ARC1133, ARC1223. An integrated design studio with components of Architectural Design (3 cr), Site Design (2 cr), Architectural Theory/Analysis (1 cr) and Forum (1 cr). A discovery of the integration of cultural awareness and the design of the built environment through an introduction to architectural design principles, processes, and methods, as well as site design and architectural theory, Site/landscape design in a studio, and as part of the Forum lecture series, focuses on the physical elements of a site, their influence on site development and their effect on the architectural design. Fundamental aspects of architectural thought in architectural theory and analysis. Lect. 2 hrs., Studio 10 hrs. 7 hours credit.

ARC2127 INTEGRATED DESIGN STUDIO 2
Prerequisite: ARC2117, ARC2813 or CAD experience. An integrated design studio with components of Architectural Design (3 cr), Interior Architecture (2 cr), Lighting (1 cr) and a Physics/Structures lab (1 cr). Development of architectural design principles, theories, processes and cultural awareness emphasizing the qualitative relationships between elements and an introduction to behavioral and psychological theories as they relate to experiencing the built environment. Elements of interior architecture and lighting, and a physics/structures lab team-taught with the faculty of the College of Arts and Sciences, are incorporated as an integral part of the architectural design experience. Interior planning includes space planning, color theory, lighting, ergonomics, and anthropometrics. Lect. 1 hr., Studio 12 hrs. 7 hours credit.

ARC2223 INTRODUCTION TO ARCHITECTURAL MODELS
Prerequisites: ARC1133, ARC1223. Students fabricate and study architectural scale models ranging from full size construction detail mock-ups to 1”/100 site studies. Models of interior space and form are included. Combinations of materials and fabrications methodology studied and practiced. Emphasis on craft quality and appropriateness of representation. The impact of material and scale choices through various assignments, such as variations in model scale or modeling materials to gain insights into the significance such choices have on perception. Lect. 1 hr., Lab 4 hrs. 3 hours credit.

ARC2313 BUILDING SYSTEMS 1
Prerequisites: CAD course or proof of proficiency and ARC2127. An intensive studio focusing on building materials and processes as they relate to construction document preparation of a multi-story, light frame building. Emphasis on the nature, development, and properties of materials and systems most often selected for this type of construction. Selection includes consideration of various structural systems, circulation methods, as well as geographical, climatic and safety issues. Construction materials studied include wood, concrete, brick, and glazed ceramic products. Projects incorporate the study of current zoning ordinances, building codes, and ADA as well as required field trips. Sem. 3 hrs., Studio 3 hrs. 3 hours credit.

ARC2323 BUILDING SYSTEMS 2
Prerequisite: ARC2313 and CAD proficiency. A continuing intensive studio focusing on building materials and processes as they relate to construction document preparation for multi-story, steel frame, and reinforced concrete frame buildings. Emphasis on the nature, development, and properties of materials and systems that are most often selected for this type of construction. The process leading to the selection of structural, mechanical, enclosure, and various interior building systems. Construction materials studied include structural steel, reinforced concrete, built-up and single ply roofing, aluminum and glass cladding, and concrete masonry. Projects continue the study of zoning ordinances, building and national codes. Field trips are part of the course requirements. Sem. 3 hrs., Studio 3 hrs. 3 hours credit.

ARC2514 STRUCTURES 1
Prerequisite: PHY2213. Structural theory: statics by analytical and graphical solutions. Determination of loads, resolution of force systems, and equilibrium analysis. Structural properties of shape (centroids, moment of inertia) and materials (stress, stiffness, modulus of elasticity). Shear and bending moments, deflection, column theory, elementary indeterminate structures, and introductory awareness of structural system behavior. Introduction to the structural design process. Lect. 4 hrs. 4 hours credit.

ARC2803 MICRO-COMPUTER IN ARCHITECTURE
Prerequisite: COM2103. The integrated use of architectural computer applications through the use of micro-computers. Preparation and program application, employing personal computers to produce graphical and alpha-numeric data. Production of informational analysis, report generation, and presentation techniques. Lect. 2 hrs., Lab 2 hrs. 3 hours credit.

ARC2813 ELECTRONIC METHODOLOGIES 1
Prerequisite: 0. An introduction to the use of the computer to graphically generate databases as an aid in planning, management and design processes related to architecture and presentation. An introduction to system design, project work flow, project organization, integration, networking and an awareness of Geographic Information System (GIS) database technology. Includes application theory and related terminology, with various CAD systems and analysis programs available to the architect/engineer. Lect. 2 hrs., Lab 2 hrs. 3 hours credit.
ARC3011-14 DIRECTED STUDY
Prerequisites: Junior standing, minimum GPA of 2.50 and written approval of the dean prior to registration. Research or project on a selected architectural or environmental topic of interest, pursued under the close supervision of, and interaction with, an assigned faculty member. The topical study must not reiterate the content associated with any other course listed in the Catalog. The project or research topic may be undertaken as either an individual or team effort. (Note: Students must provide written “Plan of Study” for approval by the dean and faculty advisor prior to registration.) 1-4 hours credit

ARC3117 INTEGRATED DESIGN STUDIO 3
Prerequisite: ARC2127. An integrated design studio with components of Architectural Design (4 cr), Urban Spatial Structure (2 cr), and Landscape Architecture (1 cr). An exploration of meaning in architecture generated by cultural, political, and philosophical determinants. Architecture, planning, and landscape architecture are studied through an analysis of the intentions, values, and priorities to human needs. Urban spatial structure involves a theoretical study of urban forms and land uses, with organizational principles, patterns, and interactions of a metropolitan area. Topics from landscape architecture include an in-depth study of site aesthetics, functions, environmental influences, and elements from theory and practice. Lect. 1 hr., Studio 12 hrs. 7 hours credit

ARC3123 FURNITURE DESIGN
Prerequisite: ARC2127. Survey of western furniture design and fabrication since the Industrial Revolution. Materials and methods of construction. Several design studio problems culminate with student-made furniture. Lect. 1 hr., Lab 1 hr., Studio 2 hrs. 3 hours credit

ARC3127 INTEGRATED DESIGN STUDIO 4
Prerequisites: ARC3117, ARC2313, ARC2514. An integrated design studio with components of Architectural Design (4 cr), Urban Spatial Structures (2 cr), and Structures/Building Systems (1 cr). A broadening of the inquiry of meaning through values and ethics as they relate to time, place, human needs and values. Aspects of design, structure, and building systems through technological, analytical, and conceptual integrations. Urban spatial structure includes planning methods, and the role of government agencies in shaping the urban environment, development costs, environmental impact analysis, legal considerations and governmental review procedures. Topics from structures/building systems include incorporation of environmental, structural, and cladding systems into building design, and selection of materials and systems. Lect. 1 hr., Studio 12 hrs. 7 hours credit

ARC3133 AIRBRUSH ILLUSTRATION
Prerequisite: Junior standing. Fundamentals of illustration with the airbrush, including history, equipment selection, handling and materials. Basic control skills and exercises will support the development of expressing textures, surfaces and entourage. Continued study of the effects of mood and composition will support individual interpretations of architectural imagery. Lect. 2 hrs., Studio 4 hrs., 3 hours credit

ARC3143 GEOGRAPHIC INFORMATION SYSTEM METHODOLOGY
Prerequisite: Junior standing. A comprehensive study of GIS technology and commercial software. Use of modeling and statistical tools for analysis of patterns and trends in database compilation. Through applications, the student develops critical thinking skills as they relate to projects in urban planning and analysis. Lect. 2 hrs., Lab 2 hrs., 3 hours credit

ARC3153 LEADED GLASS STUDIO
Prerequisite: Junior standing. The history of stained glass and its use in architecture, with particular reference to cathedrals. The use of symbolism in medieval stained glass, Tiffany examples in houses, and Frank Lloyd Wright’s use of glass. The course enriches the study of glass as a material. Each student will design and complete a project in leaded glass. Lect. 1 hr., Studio 4 hrs., 3 hours credit

ARC3313 HISTORY OF THE DESIGNED ENVIRONMENT 1
Prerequisite: 0. History and philosophy of architecture in a context of related arts, crafts, and designed setting, studied in significant periods of the western world of antiquity, the Middle Ages (including Byzantine and Islamic extensions), and the Renaissance and Baroque eras. Lect. 3 hrs. 3 hours credit

ARC3323 HISTORY OF THE DESIGNED ENVIRONMENT 2
Prerequisite: ARC3313. History and philosophy of architecture and related design studied in significant periods in Asian, Pre-Columbian cultures and in the modern world from the 18th century. Lect. 3 hrs. 3 hours credit

ARC3333 WESTERN TRADITIONS OF ART 1
Prerequisite: 0. Painting, sculpture, and graphic arts in the western world from the Paleolithic period through the Rococo style. The development of major styles and the work of major artists within the larger cultural framework of political, economic, geographic, and cultural trends. Techniques of art, the role of the artist and the relationship between art and architecture. Lect. 3 hrs. 3 hours credit

ARC3343 WESTERN TRADITIONS OF ART 2
Prerequisite: 0. Painting, sculpture, and the graphic arts in the western world from the ecoclassic period to the present. The same development as given in ARC3333, with an emphasis on current trends in art. Lect. 3 hrs. 3 hours credit
ARC3653 NON-WESTERN TRADITIONS OF ART AND ARCHITECTURE 1
Prerequisite: 0. The artistic traditions of sub-Saharan Africa; Pre-Columbian Mesoamerica, South America and North America; Native North America; and Oceania. Emphasis on creating an understanding of the works of art within their cultural setting. Art and architecture presented in a unified way. Lect. 3 hrs. 3 hours credit

ARC3663 NON-WESTERN TRADITIONS OF ART AND ARCHITECTURE 2
Prerequisite: 0. Artistic traditions of the Indian sub-continent, China, and Japan. Emphasis on creating an understanding of the works of art within the cultural setting of these areas. The development of Hinduism, Buddhism, and Zen Buddhism is linked to their influence on both art and architecture. Lect. 3 hrs. 3 hours credit

ARC3823 ELECTRONIC METHODOLOGIES 2
Prerequisite: ARC2813. Introduction to the use of the computer as a three-dimensional aid in the design process related to architecture and interior architecture. Solid modeling, isometric and perspective generation, interactive viewing, batch processing, and application theory. Special focus on the generation and manipulation of three-dimensional solid models. Computer graphic color rendering, multi-media workstations, computer animation, and virtual reality. Lect. 2 hrs., Lab 2 hrs. 3 hours credit

ARC3991-4 SPECIAL TOPICS
Prerequisite: Sophomore standing. Experimental, special and timely projects undertaken by groups of students. A total of 8 semester credits may be earned, but no more than 4 in any one semester. 1-4 hours credit

ARC4113 GREAT BOOKS OF ARCHITECTURE
Prerequisite: Senior standing. From Vitruvius to the present, architects have recorded their ideas about design and building. A focus on texts written by architects. Participants discuss the writers' ideas and work in relation to its historical context. Readings drawn from the works of Vitruvius, Alberti, Palladio, Laugier, Sullivan, Loos, LeCorbusier, Aldo Rossi, Robert Venturi, Daniel Libeskin, Rem Koolhaas and other writers. Weekly reading assignments, a research paper, lectures, slides and discussion. Lect. 3 hrs. 3 hours credit

ARC4114 ARCHITECTURAL DESIGN STUDIO 5
Prerequisites: ARC3127, ARC2323, ARC3523. An integral architectural endeavor that synthesizes and builds upon the various design experiences of the previous years. Collective issues are integrated, including: programming, environmental concerns, structure, and building systems. Clarity of thought and sensitivity of design are explored in design proposal format through the vehicles of writing and graphic portrayal as a means of professional communication. The instructor serves as both coach and facilitator. Projects are reviewed and evaluated by a jury from the architectural profession. Studio 8 hrs. 4 hours credit

ARC4123 PROFESSIONAL AWARENESS
Prerequisite: Junior standing. An overview of professional practice in the contemporary setting, combined with exploring career alternatives, the steps required for entry into a professional degree program, the internship years and licensure. Professional ethics and interdisciplinary professional relationships. Professionals will visit the classroom. Field trips. Reports, examinations and class participation measure the student's understanding of course objectives. Sem. 3 hrs. 3 hours credit

ARC4124 ARCHITECTURAL DESIGN STUDIO
Prerequisite: ARC4114. Co-requisite: as prescribed for specific projects. Traditional or specialized areas of architectural design. A reflective experience is nurtured by an increased cognizance of intrinsic architectural elements that help orchestrate the built environment. Individual instructors may elect to focus inquiry on a variety of issues that can provide a cornerstone for design development that is an essential step in the realization of architecture. Issues include aesthetic, psychological, environmental, structural, and construction. In addition, architectural projects may encompass certain pivotal allied design concerns. Studio 8 hrs. 4 hours credit

ARC4133 PASSIVE SOLAR DESIGN STRATEGIES
Prerequisite: ARC3413 or with instructor's permission. A comprehensive examination of the natural forces which impact the design of buildings. Environmental control systems for buildings with particular emphasis on passive solar design of heating, ventilating, daylighting, air conditioning systems, and other natural energy sources, their application and integration in the design of buildings. Lect. 2 hrs., Lab 2 hrs. 3 hours credit

ARC4173 FRANK LLOYD WRIGHT AND HIS TIMES
Prerequisite: ARC3623. The architecture, planning, and writings of Frank Lloyd Wright and his influence on contemporary architecture. Includes antecedent contributions of H.H. Richardson, Louis Sullivan, and the Chicago School, together with the context of other contemporary architectural philosophies. A special focus is the University-owned Affleck House designed by Wright during his Usonian period. Lect. 3 hrs. 3 hours credit

ARC4183 TWENTIETH-CENTURY ARCHITECTURE
Prerequisite: ARC3623. A historical and theoretical study of the transformation of European and American architecture in the 20th century. Study topics may include the effects of urbanism and suburbia, architecture of commerce and everyday life, and personal and political expression through building. Lect. 3 hrs. 3 hours credit

ARC4203 GRAPHIC SYSTEMS
Prerequisites: ARC1133, ARC1223. Architecture and interior architecture applications of information delivery, including signage systems, wall graphics, and business identity systems (i.e. logo/mark development, brochure design), the communication of information as transmitted through words and symbols, and the study of type and graphic/visual composition. Lect. 2 hrs., Studio 2 hrs. 3 hours credit

ARC4214 ALLIED DESIGN STUDIO: DESIGN DEVELOPMENT
Prerequisite: ARC4114. Refinement in detail of a previous architectural design project. Emphasis on design development, integrated building systems, lighting design, code compliance, and issue resolution. Studio 8 hrs. 4 hours credit

ARC4223 THE BAUHAUS
Prerequisite: ARC3623. A comprehensive study of the German design school as a culmination of pre-World War I approaches to modern design; as a self-contained creative institution; and as a primary influence on design principles after World War II. Lect. 3 hrs. 3 hours credit
ARC4224 ALLIED DESIGN STUDIO: SUSTAINABLE ARCHITECTURE
Prerequisites: Senior standing, ARC2323, ARC3413, ARC3127. A design studio focusing on the study of sustainable building concepts, green architecture strategies and systems development with a particular focus on industrial architecture. The comprehensive design studio will encompass site and environmental planning, material and system selection, and integration of technology to create works that are functionally, aesthetically, and environmentally sound. Students will develop fully integrated design solutions. Studio 8 hrs. 4 hours credit

ARC4234 ALLIED DESIGN STUDIO: INTERIOR ARCHITECTURE
Prerequisites: Senior level in Architecture or Interior Architecture. Synthesis of design principles, philosophies, and processes in developing solutions for a variety of interiors including residential interiors and health care facilities. Comprehensive application of the interior design process including programming, design development, detailing, and documentation. Advanced techniques in graphic design will be applied along with electronic methods in 3-D design development and documentation of design solutions. Studio 8 hrs. 4 hours credit

ARC4244 ALLIED DESIGN STUDIO: LANDSCAPE ARCHITECTURE
Prerequisite: ARC4114, Co-requisite: College of Architecture and Design field trip. An in-depth study of natural site elements and how they may be used to enhance the built environment aesthetically, functionally, and environmentally. Both pragmatic and theory-based approaches to the development of an actual project are employed as the core of course structure. An understanding of the balance among built, natural, and social environments is gained through case studies, existing projects, lectures and field trips. Studio 8 hrs. 4 hours credit

ARC4254 ALLIED DESIGN STUDIO: PRESERVATION ARCHITECTURE
Prerequisites: ARC4114, ARC2323. Introduction to architectural and planning design elements including history, site development, building techniques, landscaping, measured drawings, and legal requirements. Studio projects create a historical link from the past to the future. Studio 8 hrs. 4 hours credit

ARC4264 ALLIED DESIGN STUDIO: URBAN DESIGN
Prerequisite: ARC4114. Application of urban design and database technologies, theories, processes and methods to a current urban-based project. Feasible design solutions are developed to the existing community problem and include physical planning, urban design and land use analysis utilizing GIS as well as graphic methods for public presentation. Studio 8 hrs. 4 hours credit

ARC4274 ALLIED DESIGN STUDIO: THEORY AND COMPETITIONS
Prerequisite: ARC4114. Researching relevant issues of architectural thought in a studio contest. Because design competitions offer an effective means for bringing these issues to the architectural profession, studio assignment focuses on current competitions at the local, national and international levels. Readings, discussions, and critiques that enhance student work as well as acquaint students to the discourse of architecture. Studio 8 hrs. 4 hours credit

ARC4284 ALLIED DESIGN STUDIO: CAD
Prerequisites: ARC4114 and permission of instructor. In association with the Architecture Computer Resource Center, students select an architectural office as a studio environment. An agreement is then established between the office and the College of Architecture and Design. Students develop design drawings while working for a minimum of 8 hours/week for the duration of the semester, and communicates electronically from the office environment to the design faculty in the College of Architecture and Design. Electronic communication includes transference of drawings and on-line critiques. Studio 8 hrs., Sem. 4 hrs. 4 hours credit

ARC4293 DESIGN SUPPORT ELECTIVE
Prerequisite: ARC4114. A broadening experience supporting the architecture or allied design elective component. The content and process lends enrichment, depth, and breadth to the concentration theme of the design elective through added learning dimensions which may include guest speakers, field trips, computer imaging, environmental and cognitive mapping. Studio 6 hrs. 3 hours credit

ARC4294 ALLIED DESIGN STUDIO: THEATER APPLICATIONS
Prerequisite: ARC4114. The theater delineates issues of everyday life so they can be understood from another point of view, often refocusing situations with a new clarity. The opportunity to explore solid, void, light, color, shadow, decoration, and sound in performance as an extension of architecture. Students experiment with the interplay and interrelationship of these elements to illustrate a desired concept. Studio 8 hrs. 4 hours credit

ARC4333 THE ARTS AND CRAFTS MOVEMENT
Prerequisite: ARC3623. An examination of the Arts and Crafts movement in England and the U.S.; its development parallel to the evolution of Modernism; and the movements that grew from it in Europe. The work of key figures like Morris, Ashbee, Stickley, Hubbard, and Greene will be examined through architecture and the decorative arts. Lec. 3 hrs. 3 hours credit

ARC4403 INTELLIGENT BUILDINGS
Prerequisites: ARC2323, ARC3413. An intensive review of the technical issues to be considered in designing buildings integrating electronic intelligence, including power, audio, video, security, telecommunications and computer systems. A previously designed residence is utilized as the basis for course work. Field trips may be conducted. Professionals and other technical experts visit the classroom. Sem. 3 hrs. 3 hours credit

ARC4423 ENVIRONMENTAL SYSTEMS 2
Prerequisites: PHY2223, ARC2313. Human comfort, external and internal heat loss/gain, principles of heat transfer, fundamental thermodynamics, heating, ventilating and cooling equipment, system selection and sizing, spatial requirements, moisture migration and energy conservation. Plumbing systems overview, layout and fixtures. Fire protection overview, smoke control, automatic extinguishing systems and lighting protection. Lect. 3 hrs. 3 hours credit
ARC4433 DESIGN FOR THE AGING
Prerequisite: ARC2323.
An intensive review of the technical, sociological, psychological and architectural issues that need to be considered when designing a building that integrates those issues accommodating the physical limitations of the aging. Emphasis is placed on new residential unit design as well as adaptive reuse of existing residences to meet these needs. The process encourages problem-solving innovative approaches. The Americans with Disabilities ACT (ADA) is the basis for the technological considerations incorporated. Field trips. Professionals, technical experts and representatives of various organizations dealing with problems of the aging visit the classroom. Sem. 3 hrs. 3 hours credit

ARC4533 STRUCTURES 3
Prerequisite: ARC2514.
Analysis and design of different concrete members using the ACI Code. Includes slabs, beams, girders and foundations. Also shear problems in beams and columns designed for axial load and bending moment. Stability analysis and design of retaining walls. Lect. 3 hrs. 3 hours credit

ARC4543 STRUCTURES 4
Prerequisite: ARC4533.
Effects of continuity and indeterminacy on structures. Long-span structures, one-way and two-way systems (open-web joists, space frames). Effects of lateral forces (wind, earthquake) on building structures. Analysis and design of wood structures (joists, girders, columns). Lect. 3 hrs. 3 hours credit

ARC4563 STRUCTURAL MASONRY DESIGN
Prerequisite: ARC2514.
Analysis and design of masonry building systems using unit masonry. Structural design of non-reinforced and reinforced masonry walls, beams, columns, etc. Design of non-load bearing structures as well as mid-rise load bearing structures with an emphasis on material properties. Lect. 3 hrs. 3 hours credit

ARC4623 JAPANESE ARCHITECTURE
Prerequisite: Senior standing.
Survey of Japanese architecture, both religious and secular, dating from neolithic pit houses to contemporary examples. Particular attention to wooden domestic and temple architecture from Japan’s medieval age. Lect. 3 hrs. 3 hours credit

ARC4833 CAD 3
Prerequisite: ARC3823.
The computer as a totally integrated aid in the design, planning and management process related to architecture. Application of two-dimensional and three-dimensional computer graphic skills, and data base generation and manipulation to the solution of an architectural design problem. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

ARC4923 INTERNSHIP STUDIES
Prerequisite: Senior standing with superior academic record and approval of the Dean.
An internship work experience in the field of urban planning, architecture or an allied design discipline. The student works as a team member on projects which require conceptual or detailed responses to real problem situations. Students work under the direction of certified planners, architects or landscape architects and receive three semester credits for 300 hours of successful work performance. Internship studies may be taken only at approved institutions or organizations. Schedule and wage conditions are accepted prior to enrollment. Studio 6 hrs. 3 hours credit
the conscious development of expressive drawing. Demonstrations and timed assignments utilize traditional graphic media such as markers, graphite, and ink. Studio 6 hrs. 3 hours credit

ART2233 ILLUSTRATION COMPOSITION
Prerequisite: Sophomore standing or coordinator’s approval. Pictorial structure with emphasis on traditional as well as experimental or unusual compositional themes. Problem-solving, reference materials, story-telling, color, form, and texture through both individual interpretation and established foundations. Studio 4 hrs. 3 hours credit

ART3023 PHOTOGRAPHY
Prerequisites: ARC1133, ARC1223. The use of the camera and darkroom. Basic skills needed for visual and architectural communication and personal expression through black and white photography. Lect. 2 hrs., Studio 2 hrs. 3 hours credit

ART3113 ILLUSTRATION WITH WET MEDIA
Prerequisite: Junior standing or coordinator’s approval. The exploration of a variety of wet media with a focus on architectural subject matter. Images will include the study of architectural entourage and its support of scale. The use of natural light, aspects of reflection and the interplay of light and shadow will be emphasized. Studio 6 hrs. 3 hours credit

ART3123 ARCHITECTURAL PHOTOGRAPHY
Prerequisite: ART3023. Architecture and photography have much in common; playing on our senses through motion and containment, through our sense of time and sense of place, and through memory. Projects investigate the relationship between architecture and photography, specifically addressing the interconnectedness of perception, space, scale, and history. Through the synthesis of materials and presentation, students translate ideas and meaning as they might relate to current issues within their design studio. Lect. 2 hrs., Studio 1 hr., Lab 1 hr. 3 hours credit

ART3133 INDUSTRIAL ILLUSTRATION
Prerequisite: Junior standing or coordinator’s approval. The illustration of transportation vehicles, products and furniture. Quick sketching and detailed design hand-drawing will be utilized. Computer imagery and hand drawing will be explored. A variety of media will be explored including marker, gouache, tempera and airbrush, both in sketch and detailed format. Studio 6 hrs. 3 hours credit

ART3212 ARCHITECTURAL ILLUSTRATION 1
Prerequisite: Junior standing or coordinator’s approval. Visual and verbal presentation techniques, including graphic representation, used to describe, analyze, and delineate interior spaces. The related effects of interior illumination, texture, space, and composition are established through an analysis of the space and an understanding of the desired mood. Verbal articulation, the production of interior renderings, a review of perspective, and product/color/furniture sample boards emphasized. Studio 4 hrs. 2 hours credit

ART3213 SCULPTURE
Prerequisites: ARC1133, ARC1223. Exploration of historical and contemporary techniques and opportunities available to the architect/artist to sharpen senses of proportion, scale, sequence, and sculptural structure through modeling, carving and casting processes. Both representational and abstract works in clay, plaster, wire, wood, plastic, and related materials are considered. Lect. 1 hr., Studio 4 hrs. 3 hours credit

ART3223 ARCHITECTURAL ILLUSTRATION 2
Prerequisite: ART3122 or coordinator’s approval. Visual and verbal presentation techniques, including graphic representation used to describe, analyze and delineate section drawings, axonometrics, elevation drawings, site and topographic views, plan graphics, perspectives, details and composite board representation. Articulation and the production of color renderings and reprographic methods are emphasized, including techniques of office retrocolor, reprographic and photographic image development, commercial printing, and image transfer methodologies. Media include but are not limited to photo mylar, Xerox, vellum, sepia prints, luminous brand mural paper airbrush, wax-based pencil, computer-generated images/hard-copy. Studio 6 hrs. 3 hours credit

ART3313 ENVIRONMENTAL COLOR DESIGN
Prerequisite: Junior standing. Studio projects and lectures based on real world objectives of aesthetics, color design, color materials and research. A comprehensive exposure to the nature of color composition and planning for architecture and the allied disciplines. Lect. 1 hr., Studio 2 hrs., 3 hours credit

ART3323 PORTFOLIO DESIGN
Prerequisites: COM2103, Junior/Senior standing. A comprehensive and intensive development into the creation of a senior portfolio in illustration and design. Under close supervision, students prepare portfolios which are analyzed for content and presentation. Emphasis is placed on visual and verbal techniques of presentation, business practices/communication, the interview and fair practice agreements in the profession. Lect. 2 hrs., Studio 2 hrs. 3 hours credit
ART3603 HISTORY OF ARCHITECTURAL ILLUSTRATION  
Prerequisite: ARC3633. Historical development of the profession of architectural illustration from the beginning of the 18th century until the present. Artistic, social, cultural, political, and economic issues influencing drawing/painting theories and their development are investigated. Lect. 3 hrs. 3 hours credit

ART4233 ARCHITECTURAL ILLUSTRATION 3  
Prerequisite: ART3223 or coordinator’s approval. The study of various exterior forms and spaces in urban and rural environments in pursuit of special skills and methods of delineation emphasizing color. Nature of the urban environment including various forms of aerial communication, i.e. the high-rise building and cityscape skyline, as well as ideas concerning modern city and suburban environments. The ability to symbolize ideas, analyze building materials and capture the experience of nature and the built environment are emphasized through the development of freehand perspective sketching and color rendering skills. Studio 6 hrs. 3 hours credit

ART4243 ARCHITECTURAL ILLUSTRATION 4  
Prerequisite: ART4233 or coordinator’s approval. The study of digital media in combination with hand drawing. Presentation issues include a focus on the study of environmental color, sequence, pattern, and proportions. Light quality studies include seasonal change and various conditions of artificial light. Studio 6 hrs. 3 hours credit

ART4512 SENIOR THESIS 1  
ART4522 SENIOR THESIS 2  
Prerequisite: Senior standing or coordinator’s approval. Advanced study of original research and artistic production of a selected topic, with in-depth analysis and the generation of alternative solutions. Development of one alternative into a fully documented final solution to be exhibited. Sem. 1 hr., Studio 2 hrs. 2 hours credit

INTERIOR ARCHITECTURE

ARI3115 INTERIOR ARCHITECTURE 1  
Prerequisite: ARC2127. Integrated design studio with components of Office Design (3 cr.) and Computer Applications in Interior Design (2 cr.). Comprehensive application of the design process in developing office interiors while integrating computer applications such as CAD, CAP, and Internet resources. Lect. 1 hr., Studio 8 hrs. 5 hours credit

ARI3128 INTERIOR ARCHITECTURE 2  
Prerequisite: ARI3115. Integrated design studio with components of Hospitality Design (3 cr.), Finish Construction Materials (3 cr.), Furniture Design (1 cr.), and Millwork Design (1 cr.). Comprehensive application of the design process to hospitality design projects that include custom furniture and millwork. Technical and aesthetic aspects of finish construction materials are examined and applied in studio project. Lect. 4 hrs., Studio 8 hrs. 8 hours credit

ARI4103 GRAPHICS  
Prerequisites: ARC1133, ARC1223. Architecture and interior architecture applications of dimensions in graphic information/signage systems, business codes identity and way finding, type and logo/mark development as transmitted through words and symbols in addition to an in-depth study of type and graphic/visual communication. Lect. 1 hr., Studio 4 hrs. 3 hours credit

ARI4112 HISTORY OF FURNITURE  
Prerequisites: ARC3613, ARC3623. A survey of interior furniture and decorative elements from ancient times through today. Styles, materials and color of the various period furnishings, along with economic and social factors influencing their development. Lect. 2 hrs. 2 hours credit

ARI4123 ENVIRONMENTAL PSYCHOLOGY  
Prerequisite: Senior standing. An exploration of the influences of environments on human behavior, including a study of the methods and tools used to evaluate psychological response and human needs. Sem. 3 hrs. 3 hours credit

ARI4133 INTERIOR ARCHITECTURE 3  
Prerequisite: ARI3128. Development of retail interior environments with emphasis on the relationship between the design concept and the merchandising techniques. The student develops a strong sense of experimental development through the use of the design elements of space, motif, color, lights and graphics. Lect. 1 hr., Studio 4 hrs. 3 hours credit

ARI4143 ADVANCED LIGHTING  
Prerequisite: ARC3413. A comprehensive study of lighting in building interiors, synthesizing design elements and principles with technical knowledge, in solving complex lighting design problems. Lect. 1 hr., Studio 4 hrs. 3 hours credit

ARI4223 INTERIOR DESIGN PRACTICE  
Prerequisite: 0. The study of the interior design profession; theoretical and practical functions of commercial/contract practice as a business including management, planning, marketing, or organizational structure, firm activities and scheduling, professional contract interior services and ethics, business liabilities and legal responsibilities. Sem. 3 hrs. 3 hours credit

ARI4353 PRESERVATION TECHNOLOGY  
Prerequisite: Sophomore standing. Historical development of the American building style as related to structural and material techniques, including technical methods of preservation, archaeological implications, building moving methods, maintenance and integration of mechanical systems. Lect. 3 hrs. 3 hours credit

ARI4922 INTERNSHIP STUDIES  
Prerequisite: ARH133. Internship work experience in an interior design firm or the interior design department of an architectural firm for a minimum of 150 hours during the 15 week period. Requires the presentation of a weekly work log documenting the work experience. Regularly scheduled seminars and a final report plus a written assessment from the employer is required for class credit. Sem. 2 hrs. 2 hours credit
The goal of the College of Arts and Sciences is to develop in all students the ability to think critically, to solve problems creatively, and to make imaginative and rational decisions. The College prepares students for success at the University and for active, responsible, and creative lives. It cultivates the desire to excel in professional and personal endeavors and the ability to understand and work with people of various cultures.

In Arts and Sciences, teaching excellence comes first. Through its Core Curriculum students share a common experience encompassing the wide varieties of human thought. Instructors employ new learning technologies to teach the best in classical and contemporary thought and practice. The College is guided in all of its endeavors by its motto: “A Classic Education for a Technological World.”

The College is committed to the enhancement of learning for people of all backgrounds and ages. It works for expanded educational and career opportunities for women and minorities. It offers programs for elementary and secondary school children and their teachers. It offers a range of programs that serve the professional community.

In all of its activities, the College is driven by its commitment to the primary value of free, informed choice as the basis for responsible action. Complementing this goal, Arts and Sciences strives to foster civility in social relations — a civility that grows out of respect for the worth of all individuals.

The College of Arts and Sciences seeks to prepare students to grow intellectually and carry out fully their responsibility to those around
them, whether in their families or in their public and professional lives.

The College’s Core Curriculum provides a well-rounded educational experience for all Lawrence Tech students. Students encounter the greatest literary and philosophical works that humankind has produced and discuss them with professors in small classes. They explore physics and chemistry in a hands-on laboratory environment, and gain a solid foundation in mathematics. Composition and communications courses develop a high level of accomplishment in speaking and writing.

**DEGREE PROGRAMS**

The College provides degree programs in administration, business administration, chemistry, environmental chemistry, chemical technology, computer science, the humanities and social sciences, mathematics, technical communication, and physics. Pre-medical and pre-dental programs are arranged through the Department of Natural Sciences; pre-law through the Department of Humanities, Social Sciences, and Communication. In addition, the departments offer minors and dual majors in their disciplines (see descriptions under the curriculum guides).

The departments continually develop courses and programs in response to evolving social and technological changes. With a strong undergraduate education, Arts and Sciences graduates can prepare for immediate entry to professional life and for the continuation of their studies in graduate or professional school.

**COMPUTER SCIENCE**

The Bachelor of Science in computer science seeks to prepare students to enter a rapidly expanding industry with a heavy demand for graduates. In consultation with a faculty advisor, students can choose the mix of mathematics and computer science that best fits their background and objectives. The degree may be earned through one of three options: *Option 1*, with the most mathematics and science content, is excellent preparation for graduate school and for careers including scientific or engineering applications development. *Option 2*, with less mathematics and science, provides excellent preparation for careers in business application development. *Option 3*, with a focus on systems, is excellent preparation for a career in information systems design and implementation. Students can:
- create a program geared to their computer science interests;
- work with an outstanding faculty dedicated to student success, who will give one-on-one advising to help students reach their individual goals;
- participate in small classes that enhance interaction with teachers;
- learn in newly created specialty labs in multimedia, computer graphics, distributed computing, and robotics;
- take part in cooperative projects and in classroom, state, and national competitions that promote interaction with fellow students; and
- create links to employers through paid internships and projects while still in school.

The computer science program prepares graduates for exciting careers in application programming, distributed computing, data mining, virtual environments, computer graphics, networking, Web applications, robotics, and intelligent systems, among others.

**MATHEMATICS**

The Bachelor of Science in Mathematics degree is designed for careers in the scientific and business community where the application of mathematical analysis leads to scientific or financial solutions. In this rapidly changing world, job descriptions change. New technologies, indeed industries, are created and destroyed. But the long-standing mathematical principles on which technology is based remain and grow. Mastering mathematics theories and their practical applications provides students with a competitive edge in any career. They have available the facilities and experiences, listed above, offered to computer science students. In addition, students can:
- gain experience in using advanced mathematical and computing tools to solve real-world problems; and
- prepare for graduate work in either computer science or applied mathematics.

**ADMINISTRATION**

The Bachelor of Science in Administration provides a strong foundation in business and management, combined with a specialization of the student’s choice for a broad liberal arts education. It is an excellent choice for transfer students who wish to gain maximum credit for courses already completed. Students can:
- earn a bachelor’s degree in 60 hours if they already have an associate’s degree;
- learn from an outstanding faculty with extensive industry and academic experiences;
- participate in small classes that encourage team building and personal interaction with their instructors and peers;
- gain expert advising from a faculty member in their program, maximizing opportunities at LTU and creating a path for success after graduation;
• take advantage of paid internships; and
• participate in a network of links to professional organizations and industrial partners.

HUMANITIES

The humanities curriculum allows students to organize their education to achieve a specific professional goal while receiving a solid liberal arts education that deepens intellectual development. The program can prepare students for varied careers, including law, business, and public service. Students can:
• learn in classes taught only by qualified, experienced faculty (not graduate students), whose members are experts in their fields;
• learn in small classes that encourage interaction with teachers and fellow students;
• receive careful and caring advising focused on needs
• engage in discussion with students and faculty on a wide range of topics, including literature, art, music, philosophy, history, economics, film, and drama; and
• gain a clear understanding of the power of humanistic learning in a society influenced by science and technology.

TECHNICAL COMMUNICATION

Lawrence Tech’s program in technical communication seeks to prepare students for professional careers in written, oral, and computer-based communication. Students will learn to make technical problems and issues clear to nonspecialists. Graduates are prepared in the processes of communication and in an individually selected area of business or technology. Students can:
• learn from an outstanding faculty, experts and practitioners in their field;
• be part of small classes that support team building and continuing communication with fellow students and instructors;
• receive careful and caring advising from technical communication faculty;
• develop projects in computer classrooms and a multimedia studio equipped with up-to-date technology;
• have access as an undergraduate to paid internships in Southeast Michigan businesses; and
• make valuable connections to professional organizations and major corporations:

A Certificate in Technical Communication, consisting of 15 semester hours of study, is available to Lawrence Tech degree candidates or to students enrolling specifically for the Certificate.

CHEMISTRY/ENVIRONMENTAL CHEMISTRY

Lawrence Tech’s programs in chemistry and environmental chemistry place a strong emphasis on laboratory experience. There are several options within the chemistry program at Lawrence Tech.

Graduates who choose the degree option certified by the American Chemical Society are broadly prepared to find employment in chemistry laboratories, research, industry, medicine, biochemistry, government and education. Students are also well positioned for subsequent graduate work in chemistry, biochemistry or materials science.

The biomedical chemistry option generally satisfies the curriculum requirements for most medical, dental or veterinary schools and students are also positioned to pursue careers in the pharmaceutical and biotechnology industries or to pursue graduate work in chemistry, biochemistry and molecular biology.

Graduates who select the engineering chemistry option receive preparation in both chemistry and engineering and may pursue positions in both traditional chemistry fields as well as many of those normally filled by chemical engineers.

The environmental chemistry program offers preparation for careers in pollution prevention, hazardous waste management, chemical health and safety, environmental analysis, inspection and compliance, and the synthesis of biodegradable and photodegradable materials. It also allows students to enter graduate programs in environmental engineering and hazardous waste management. Students can:
• design a program to meet career objectives;
• qualify to become a skilled chemical laboratory professional immediately following graduation;
• work with equipment and instrumentation offering preparation for real-world employment;
• acquire the computer and communication skills needed for success in chemistry;
• participate in small classes that foster interaction with teachers and fellow students; and
• be welcomed to an award-winning American Chemical Society student chapter.

CHEMICAL TECHNOLOGY

Through the Associate of Science in chemical technology program, students have available the facilities and experiences, offered to students in the four-year chemistry program. In addition, students can:
• complete their degree in only two years;
• qualify to work as a skilled technician alongside professional chemists and chemical engineers;
• use the associate’s degree as a stepping stone to a bachelor’s degree in chemistry or chemical engineering; and
• expect readily available job opportunities upon graduation.
PHYSICS/PHYSICS AND
COMPUTER SCIENCE

The physics degree programs at Lawrence Tech place a strong emphasis on laboratory experience and the use of computers to prepare students for scientific study, research and development, and for medical, dental, and law school entrance. The programs also provide useful skills in preparation for immediate career opportunities. The Bachelor of Science in physics has many elective choices that enable students to design a degree to match their career goals in: lasers and holography, nuclear physics, bio-medical engineering, geophysics, health physics and nuclear medicine, science education, patent law, and astronomy.

The electrical and mechanical industrial physics options are featured for those who wish to work in research and development in industry. The Bachelor of Science in physics and computer science can prepare students to apply computers and sensor technology to the solving of practical problems. Students can:
• gain computer skills in Lawrence Tech labs, second to none, that allow analysis of data gathered with interfaced sensors;
• design a program to meet career objectives;
• engage in a field leading to the exciting research that drives the technological revolution, from radio astronomy to lasers, medical imaging, and supercomputers;
• join the many past LTU physics students who have gone on to the nation’s top graduate programs;

• participate in small classes where you interact closely with teachers and students
• find opportunities to participate as an undergraduate in special programs at national facilities, such as Oak Ridge, Argonne, Fermilab, and Los Alamos; and
• acquire the communication skills necessary for a successful career.

UNIVERSITY STUDIES

The Associate of Science in university studies is a two-year program designed for:
• students seeking a high quality two-year liberal arts degree;
• student undecided about their choice of major; or
• students who need to demonstrate proficiency at the university level to enter their major of choice.

Like all other majors within the College, students in university studies benefit from Lawrence Tech’s outstanding faculty, small class sizes, structured core curriculum, state-of-the-art technology and impressive laboratory facilities. In addition, students will consult with academic advisors genuinely interested in the needs and educational goals of each individual.

The program gives access to any of the baccalaureate programs at the University following the successful completion of a designated set of courses specific to that degree. Students complete classes in a variety of subject areas, fulfilling the general education requirements common to all curricula at the University. While enrolled in university studies, students may also elect to take foundational courses within their intended major, provided that the applicable mathematics and science prerequisites have been satisfied.

The university studies program at Lawrence Tech offers:
• a wide range of courses specifically designed for improving proficiency in key subject areas such as mathematics, science and communication;
• specially designed core courses, common to all Lawrence Tech degree programs, in which students develop the ability to think both critically and creatively;
• opportunities to complete selected courses in areas such as engineering, computer science, architecture and design, science, and others, in preparation for the pursuit of a four-year degree;
• an Academic Achievement Center that provides a wide range of tutoring and support services; and
• Access to Lawrence Tech’s state-of-the-art computer and laboratory facilities.
### Degree Requirements — College of Arts and Sciences

In addition to those given in the “Degrees and Graduation” section, the following requirements must be met. The specific courses that fulfill these requirements are shown on the curriculum outlines on the following pages.

#### Humanities, Social Sciences, and Communication

**Administration**

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<tr>
<th>Component</th>
<th>Hours</th>
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<td>Humanities</td>
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<td>Mathematics</td>
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<td>Statistics</td>
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**Technical Communication**

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<td>Humanities</td>
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**Mathematics and Computer Science**

**Computer Science**

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**Mathematics/Computer Science**

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**Mathematics**

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<tr>
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#### Natural Sciences

**Chemistry**

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<td>Engineering</td>
<td>11 semester hours</td>
</tr>
<tr>
<td>Biology</td>
<td>31 semester hours</td>
</tr>
<tr>
<td>General Electives</td>
<td>15 semester hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>121-127 semester hours</td>
</tr>
</tbody>
</table>

**Environmental Chemistry**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>48 semester hours</td>
</tr>
<tr>
<td>Computer Science</td>
<td>2 semester hours</td>
</tr>
<tr>
<td>Engineering</td>
<td>10 semester hours</td>
</tr>
<tr>
<td>Geology</td>
<td>3 semester hours</td>
</tr>
<tr>
<td>Humanities</td>
<td>28 semester hours</td>
</tr>
<tr>
<td>Mathematics</td>
<td>15 semester hours</td>
</tr>
<tr>
<td>Physics</td>
<td>11 semester hours</td>
</tr>
<tr>
<td>Electives</td>
<td>3 semester hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120 semester hours</td>
</tr>
</tbody>
</table>

**Chemical Technology**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>22 semester hours</td>
</tr>
<tr>
<td>Computer Science</td>
<td>5 semester hours</td>
</tr>
<tr>
<td>Humanities</td>
<td>19 semester hours</td>
</tr>
<tr>
<td>Mathematics</td>
<td>11 semester hours</td>
</tr>
<tr>
<td>Physics</td>
<td>4 semester hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61 semester hours</td>
</tr>
</tbody>
</table>

**Physics/Computer Science**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>42 semester hours</td>
</tr>
<tr>
<td>Mathematics</td>
<td>24 semester hours</td>
</tr>
<tr>
<td>Chemistry</td>
<td>9 semester hours</td>
</tr>
<tr>
<td>Computer Science</td>
<td>20 semester hours</td>
</tr>
<tr>
<td>Electives</td>
<td>3 semester hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120 semester hours</td>
</tr>
</tbody>
</table>

**Physics**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics (8 hours taught in engineering)</td>
<td>46 semester hours</td>
</tr>
<tr>
<td>Mathematics</td>
<td>24 semester hours</td>
</tr>
<tr>
<td>Humanities</td>
<td>28 semester hours</td>
</tr>
<tr>
<td>Chemistry</td>
<td>9 semester hours</td>
</tr>
<tr>
<td>Computer Science</td>
<td>2 semester hours</td>
</tr>
<tr>
<td>Electives</td>
<td>11 semester hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120 semester hours</td>
</tr>
</tbody>
</table>

**University Studies**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>22 semester hours</td>
</tr>
<tr>
<td>Natural Science</td>
<td>7 semester hours</td>
</tr>
<tr>
<td>Mathematics</td>
<td>7 semester hours</td>
</tr>
<tr>
<td>Computer Science</td>
<td>3 semester hours</td>
</tr>
<tr>
<td>Electives</td>
<td>21 semester hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>60 semester hours</td>
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</tbody>
</table>

---

Colleges of Arts and Sciences. Undergraduate Catalog 2001-2003. 63
FOUNDATION STUDIES AND SPECIAL PROGRAMS

PRE-MEDICAL, PRE-DENTAL SEQUENCES
The following courses are recommended for medical school admission. A student should contact a particular medical school for specific details about its admission policies.

<table>
<thead>
<tr>
<th>Course</th>
<th>Sem. Hrs.</th>
<th>Lawrence Tech Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year of General Biology &amp; Lab</td>
<td>8</td>
<td>BIO1213, BIO1221, BIO1223, &amp; BIO1231</td>
</tr>
<tr>
<td>1 Genetics course</td>
<td>3</td>
<td>BIO2323</td>
</tr>
<tr>
<td>1 Microbiology course &amp; Lab</td>
<td>4</td>
<td>BIO2313 &amp; BIO2321</td>
</tr>
<tr>
<td><strong>Chemistry:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year of General Chemistry &amp; Lab</td>
<td>9</td>
<td>CHM1213, CHM1221, CHM1223 &amp; CHM1232</td>
</tr>
<tr>
<td>1 year of Organic Chemistry &amp; Lab</td>
<td>8</td>
<td>CHM2313, CHM2323 &amp; CHM2332</td>
</tr>
<tr>
<td>1 Biochemistry course (usually recommended)</td>
<td>3</td>
<td>CHM3403</td>
</tr>
<tr>
<td><strong>Other Math &amp; Science Courses:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year of Physics with Lab</td>
<td>8</td>
<td>University or College Physics Courses</td>
</tr>
<tr>
<td>1 year of Mathematics with Calculus</td>
<td>8</td>
<td>MCS1414 &amp; MCS1424, or MCS1214 &amp; MCS1224</td>
</tr>
<tr>
<td>1 or 2 courses of Statistics</td>
<td>6</td>
<td>MCS2023 or MCS3403 or MCS2113 &amp; MCS2123</td>
</tr>
</tbody>
</table>

These courses can most easily be satisfied with a B.S. in Chemistry major but can also be satisfied with the following majors, with the right choice of electives.

- **B.S. in Chemistry**
- **B.S. in Math & Computer Science**
- **B.S. in Technical Communication**
- **B.S. in Computer Science**
- **B.S. in Humanities**
- **B.S. in Engineering**
- **B.S. in Administration**
- **B.S. in Physics**

PRE-BIOMEDICAL ENGINEERING
The student wishing to be accepted into a Biomedical Engineering program in graduate school should have a B.S. in Physics or Engineering with the following recommended elective courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Sem. Hrs.</th>
<th>Lawrence Tech Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 course in Organic Chemistry</td>
<td>3</td>
<td>CHM2313</td>
</tr>
<tr>
<td>1 course in basic Biology &amp; Lab</td>
<td>4</td>
<td>BIO1213 &amp; BIO1221</td>
</tr>
<tr>
<td>1 Physiology, Anatomy, Experimental Psychology or Pharmacology</td>
<td>4</td>
<td>BIO1223 &amp; BIO1231</td>
</tr>
</tbody>
</table>

PRE-LAW
An advantage of the University's core curriculum is that it develops the habits of critical and logical thinking that are central to admission to, and success in, law school. In addition, students planning to attend law school should place the greatest emphasis on skill in both oral and written communication. Both the B.S. in Humanities and the B.S. in Technical Communication provide a thorough education in communication and critical thinking, skills essential to the study of law. The Humanities degree, especially, provides excellent preparation by offering a knowledge of the context and development of the U.S. system of law and government. Additional courses in four categories are particularly valuable to prelaw students:

<table>
<thead>
<tr>
<th>Course</th>
<th>Sem. Hrs.</th>
<th>Lawrence Tech Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Law</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MGT2113: Introduction to Business Law</td>
<td>3</td>
<td>Speech</td>
</tr>
<tr>
<td>SSC4143: Constitutional Law: Individual Rights</td>
<td>3</td>
<td>Intro to Rhetoric Logic</td>
</tr>
<tr>
<td><strong>History, Philosophy, and Political Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSC3153: American History to 1877</td>
<td>3</td>
<td>Adv Pro Communication</td>
</tr>
<tr>
<td>SSC3163: American History since 1877</td>
<td>3</td>
<td>Collaborative Communication</td>
</tr>
<tr>
<td>SSC3173: American Political Tradition</td>
<td>3</td>
<td>Interpers and Nonverbal Comm</td>
</tr>
<tr>
<td>SSC3723: Ethics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SSC4133: Problems in International Politics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COM2113: Speech</td>
<td>3</td>
<td>Accounting Principles 1</td>
</tr>
<tr>
<td>COM2443: Intro to Rhetoric Logic</td>
<td>3</td>
<td>Accounting Principles 2</td>
</tr>
<tr>
<td>COM3103: Adv Pro Communication</td>
<td>3</td>
<td>Intro to Financial Mgt</td>
</tr>
<tr>
<td>COM3463: Collaborative Communication</td>
<td>3</td>
<td>Management and Supervision</td>
</tr>
<tr>
<td>COM3553: Interpers and Nonverbal Comm</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Business</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACC2013: Accounting Principles 1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACC2023: Accounting Principles 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>FIN3013: Intro to Financial Mgt</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MGT2203: Management and Supervision</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**CONTACT PERSON:** Dr. Harold Hotelling, ext. 3530, Username: HOTELLING@LTU.EDU

**Note:** Completion of the Lawrence Tech requirements in the pre-professional programs does not assure the student of admission to medical, dental, law or graduate school. Completion of the requirements and of other courses leading to a bachelor's degree does qualify a student for consideration by most professional and graduate schools.
ASSOCIATE OF SCIENCE IN UNIVERSITY STUDIES

TOTAL SEMESTER CREDIT HOURS: 60

The Associate of Science in University Studies is designed for:
- students seeking a high quality two-year liberal arts degree;
- students undecided about their choice of major; or
- students who need to demonstrate proficiency at the university level to enter their major of choice.

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th>SECOND SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course</strong></td>
<td><strong>Cr.</strong></td>
</tr>
<tr>
<td>No.</td>
<td>Subject</td>
</tr>
<tr>
<td>COM1002</td>
<td>Univ Studies Sem</td>
</tr>
<tr>
<td>COM1103</td>
<td>English Comp</td>
</tr>
<tr>
<td>MCS1003</td>
<td>Intro to Comp Appl</td>
</tr>
<tr>
<td>MCSXXX3</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THIRD SEMESTER

- LLT1223 World Masterpcs 2 3
- SSC2423 Devel Am Exper 3 3
- Natural Science 1 3
- Electives 6
- 15

FOURTH SEMESTER

- HSSC Elective 3
- Natural Science 2 3
- Natural Sci Lab 1 1
- Electives 8 15

While enrolled in the University Studies program, students preparing to enter LTU four-year degree programs will complete courses that fulfill the general education requirements common to all curricula. In most cases, they will also have the opportunity to complete foundational courses specific to their intended major, provided that the applicable mathematics and science prerequisites have been satisfied. Initial course selections will be determined on the basis of students’ placement assessment results.

To be eligible to apply for transfer into a four-year major, a student must have achieved satisfactory performance in a minimum of 12 credit hours of coursework, including specific courses applicable to their program of choice. Students must see their academic advisors for additional information on course prerequisites, appropriate choices for elective courses, transfer eligibility requirements, and further information specific to their degree programs.

For information about the University Studies program or to speak with an advisor, contact the College of Arts and Sciences at (248) 204-3500, e-mail to SCIDEAN@LTU.EDU, or visit room S101 in the Science Building.
BACHELOR OF SCIENCE IN ADMINISTRATION

The Bachelor of Science in Administration is designed for students with associate degrees, who are often able to complete their bachelor's degree with as few as 60 additional credit hours at Lawrence Tech. However, other students are welcomed into the program. The courses shown below are Lawrence Tech courses required for the degree. Courses transferred from other institutions or taken at Lawrence Tech will be evaluated as electives or Lawrence Tech equivalents.

ARTS AND SCIENCES CORE (49 CREDIT HOURS)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MATHEMATICS/STATISTICS (11 CREDIT HOURS)</strong></td>
<td></td>
</tr>
<tr>
<td>MCS1214 Math Analysis 1</td>
<td>4</td>
</tr>
<tr>
<td>MCS1224 Math Analysis 2</td>
<td>4</td>
</tr>
<tr>
<td>MCS2113 Statistics 1</td>
<td>3</td>
</tr>
<tr>
<td><strong>SCIENCE (7 CREDIT HOURS)</strong></td>
<td></td>
</tr>
<tr>
<td>PSC1113 Physical Science 1</td>
<td>3</td>
</tr>
<tr>
<td>PSC1123 Physical Science 2</td>
<td>3</td>
</tr>
<tr>
<td>PSC1131 Physical Science Lab</td>
<td>1</td>
</tr>
<tr>
<td><strong>ENGLISH/COMMUNICATIONS (10 CREDIT HOURS)</strong></td>
<td></td>
</tr>
<tr>
<td>COM1001 University Seminar</td>
<td>1</td>
</tr>
<tr>
<td>COM1103 English Comp</td>
<td>3</td>
</tr>
<tr>
<td>COM2103 Tech &amp; Prof Comm</td>
<td>3</td>
</tr>
<tr>
<td>COM3103 Adv Prof Comm</td>
<td>3</td>
</tr>
<tr>
<td><strong>HUMANITIES (15 CREDIT HOURS)</strong></td>
<td></td>
</tr>
<tr>
<td>LLT1213 World Masterpieces 1</td>
<td>3</td>
</tr>
<tr>
<td>LLT1223 World Masterpieces 2</td>
<td>3</td>
</tr>
<tr>
<td>SSC2423 Devel Am Exper</td>
<td>3</td>
</tr>
<tr>
<td>Open Electives</td>
<td>6</td>
</tr>
<tr>
<td><strong>ECONOMICS (6 CREDIT HOURS)</strong></td>
<td></td>
</tr>
<tr>
<td>SSC2313 Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>SSC2323 Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td><strong>MANAGEMENT CORE (30 CREDIT HOURS)</strong></td>
<td></td>
</tr>
<tr>
<td>MGT2203 Management &amp; Supervision</td>
<td>3</td>
</tr>
<tr>
<td>MGT2113 Intro Business Law</td>
<td>3</td>
</tr>
<tr>
<td>ACC2013 Accounting Principles 1</td>
<td>3</td>
</tr>
<tr>
<td>ACC2023 Accounting Principles 2</td>
<td>3</td>
</tr>
<tr>
<td>HRM3013 Org Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MKT3013 Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>FIN3103 Intro Finance Mgt</td>
<td>3</td>
</tr>
<tr>
<td>TOM3113 Operations Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>MGT4213 Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>INT3023 Information Technology</td>
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</tbody>
</table>

Plus additional electives to total 121 semester hours

BACHELOR OF SCIENCE IN HUMANITIES

Total Semester Credit Hours: 121

FRESHMAN YEAR

FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1001</td>
<td>University Seminar</td>
<td>1</td>
</tr>
<tr>
<td>COM1103</td>
<td>English Comp</td>
<td>3</td>
</tr>
<tr>
<td>MCS1214</td>
<td>Intro to Comp Appl</td>
<td>3</td>
</tr>
<tr>
<td>MCS1224</td>
<td>Intro to Math An</td>
<td>4</td>
</tr>
<tr>
<td>PSC1113</td>
<td>Physical Science</td>
<td>3</td>
</tr>
<tr>
<td>PSC1123</td>
<td>Physical Science</td>
<td>3</td>
</tr>
<tr>
<td>PSC1131</td>
<td>Physical Science Lab</td>
<td>1</td>
</tr>
<tr>
<td>LLT1213</td>
<td>World Masterpieces</td>
<td>3</td>
</tr>
<tr>
<td>LLT1223</td>
<td>World Masterpieces</td>
<td>3</td>
</tr>
<tr>
<td>SSC2423</td>
<td>Devel Am Exper</td>
<td>3</td>
</tr>
<tr>
<td>Open Electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
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SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM2103</td>
<td>Tech &amp; Prof Comm</td>
<td>3</td>
</tr>
<tr>
<td>COM3103</td>
<td>Adv Prof Comm</td>
<td>3</td>
</tr>
<tr>
<td>SSC2423</td>
<td>Devel Am Exper</td>
<td>3</td>
</tr>
<tr>
<td>Open Electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
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</tbody>
</table>

JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLT3113</td>
<td>Eng Lit to 1800</td>
<td>3</td>
</tr>
<tr>
<td>LLT3213</td>
<td>Amer Lit to 1900</td>
<td>3</td>
</tr>
<tr>
<td>SSCXXX3</td>
<td>Soc Sci Elective</td>
<td>3</td>
</tr>
<tr>
<td>Open Electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

SENIOR YEAR

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLT4113</td>
<td>Early Shakespeare</td>
<td>3</td>
</tr>
<tr>
<td>LLT4513</td>
<td>Sem in Lit</td>
<td>3</td>
</tr>
<tr>
<td>SSCXXX3</td>
<td>Soc Sci Elective</td>
<td>3</td>
</tr>
<tr>
<td>Open Electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

For more information about the Humanities program or to speak with an advisor, contact the Humanities, Social Sciences, and Communication department at (248) 204-3520, e-mail to HUMCHAIR@LTU.EDU, or visit room S225 in the Science Building.
BACHELOR OF SCIENCE IN COMPUTER SCIENCE - OPTION 1

Total Semester Credit Hours: 120

FRESHMAN YEAR

FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Crs.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Crs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1001</td>
<td>University Seminar</td>
<td>1</td>
<td>COM2113</td>
<td>Speech</td>
<td>3</td>
</tr>
<tr>
<td>COM1103</td>
<td>English Comp</td>
<td>3</td>
<td>MCS1224</td>
<td>Intro to Math An 2</td>
<td>4</td>
</tr>
<tr>
<td>MCS1142</td>
<td>Intro to C</td>
<td>2</td>
<td>MCS1424</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MCS1414</td>
<td>Calculus 1</td>
<td>4</td>
<td>MCS1514</td>
<td>Computer Sci 1</td>
<td>4</td>
</tr>
<tr>
<td>SSC2413</td>
<td>Found Am Exper</td>
<td>3</td>
<td>SSC2423</td>
<td>Devel Am Exper</td>
<td>3</td>
</tr>
</tbody>
</table>

13

SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Crs.</th>
<th>Course No.</th>
<th>Subject</th>
<th>Crs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM2103</td>
<td>Tech &amp; Prof Comm</td>
<td>3</td>
<td>COM3553</td>
<td>Interpersonal Com</td>
<td>3</td>
</tr>
<tr>
<td>LLT1213</td>
<td>World Masterpcs 1</td>
<td>3</td>
<td>COM3453</td>
<td>Resrch Prin/Meth</td>
<td>3</td>
</tr>
<tr>
<td>SSC2303</td>
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<tr>
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<td>3</td>
<td>SSC2423</td>
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<tr>
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<td>Open Elective</td>
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15

JUNIOR YEAR

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<th>Course No.</th>
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SENIOR YEAR

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BACHELOR OF SCIENCE IN TECHNICAL COMMUNICATION

Total Semester Credit Hours: 121

FRESHMAN YEAR

FIRST SEMESTER

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SOPHOMORE YEAR

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JUNIOR YEAR

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SENIOR YEAR

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CERTIFICATE IN TECHNICAL COMMUNICATION

The Certificate in Technical Communication requires the following courses:

- COM2103 Tech & Prof Comm or COM3493 Tech Writ & Presen
- COM2113 Speech
- COM3473 Document Design or COM3483 Presentation Media

6 credits in other COM courses, 2000 level or higher.

For more information about the technical communication programs or to speak with an advisor, contact the Humanities, Social Sciences, and Communication department at (248) 204-3520, e-mail to HUMCHAIR@LTU.EDU, or visit room S225 in the Science Building.

COMPUTER SCIENCE MINOR:

Students must take 24 credits of computer science courses.

DUAL MAJOR IN COMPUTER SCIENCE AND ENGINEERING:

Engineering students can earn a dual major in computer science and engineering by completing 40 additional credit hours of mathematics and computer science (12 courses) beyond the engineering requirements.

For more information about the computer science program or to speak with an advisor, contact the Mathematics and Computer Science department at (248) 204-3560, e-mail to MCSCHAIR@LTU.EDU, or visit room S120 in the Science Building.
# Bachelor of Science in Computer Science - Option 2

**Total Semester Credit Hours: 121**

## Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tr>
<td>COM1001</td>
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<td>World Masterpcs 1</td>
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<tr>
<td>COM1103</td>
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<td>SSC2423</td>
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<td>PSC1113</td>
<td>Physical Sci 1</td>
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## Sophomore Year

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<td>MCS2534</td>
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<td>MCS2524</td>
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<td>MCS3633</td>
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## Junior Year

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<td>Statistics 2</td>
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<td>MSCXXX3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>MCS3663</td>
<td>Arch &amp; Assembler</td>
<td>3</td>
<td>MCS4663</td>
<td>Operating Syst</td>
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## Senior Year

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<th>Subject</th>
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<td>Comp Networks</td>
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<td>MCS4833</td>
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## Computer Science Minor:

Students must take 24 credits of computer science courses.

## Certificate in Computer Science:

The certificate in Computer Science requires the following courses:

- MCS1514
- MCS3663
- MCS4613
- MCS2514
- MCS4653
- MCS2534

For more information about the computer science program or to speak with an advisor, contact the Mathematics and Computer Science department at (248) 204-3560, e-mail to MCSCHAIR@LTU.EDU, or visit room S120 in the Science Building.

---

# Bachelor of Science in Computer Science - Option 3

**Total Semester Credit Hours: 121**

## Freshman Year

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## Computer Science Minor:

Students must take 24 credits of computer science courses.

## Certificate in Information Systems:

The certificate in Information Systems requires the following courses:

- MCS3623
- MCS3673
- MCS4663
- MCS3663
- MCS4613
- MCS5703

For more information about the computer science program or to speak with an advisor, contact the Mathematics and Computer Science department at (248) 204-3560, e-mail to MCSCHAIR@LTU.EDU, or visit room S120 in the Science Building.
### Bachelor of Science in Mathematics and Computer Science

**Total Semester Credit Hours: 121**

#### Freshman Year

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#### Sophomore Year

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<tr>
<td>MCS2514</td>
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<td>4</td>
</tr>
<tr>
<td>MCS2524</td>
<td>Discrete Math</td>
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</tr>
<tr>
<td>PHY2413</td>
<td>Univ Physics 1</td>
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#### Junior Year

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<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Hrs.</th>
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<tbody>
<tr>
<td>SSCXXX3</td>
<td>Jr/Sr Elective</td>
<td>3</td>
</tr>
<tr>
<td>MCS3663</td>
<td>Arch &amp; Assembler</td>
<td>3</td>
</tr>
<tr>
<td>MCS3723</td>
<td>Advanced Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MCS3543</td>
<td>Data Base Sys</td>
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</tr>
<tr>
<td>MCS3863</td>
<td>Linear Algebra</td>
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<tr>
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#### Senior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Hrs.</th>
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<tbody>
<tr>
<td>MCS4833</td>
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<tr>
<td>MCS3733</td>
<td>Part Diff Equat</td>
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</tr>
<tr>
<td>MCS4813</td>
<td>Numerical Anal 1</td>
<td>3</td>
</tr>
<tr>
<td>MCS4613</td>
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For more information about the mathematics and computer science program or to speak with an advisor, contact the Mathematics and Computer Science department at (248) 204-3560, e-mail to MCSCHAIR@LTU.EDU, or visit room S120 in the Science Building.

### Bachelor of Science in Mathematics

**Total Semester Credit Hours: 122**

#### Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tbody>
<tr>
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<td>COM1103</td>
<td>English Comp</td>
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<td>CHM1213</td>
<td>University Chemistry 1</td>
<td>3</td>
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<td>CHM1221</td>
<td>Univ Chem 1 Lab</td>
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<tr>
<td>MCS1142</td>
<td>Intro to C</td>
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<td>MCS1414</td>
<td>Calculus 1</td>
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#### Sophomore Year

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<tbody>
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<td>LLC1213</td>
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<tr>
<td>MCS2414</td>
<td>Calculus 3</td>
<td>4</td>
</tr>
<tr>
<td>MCS2524</td>
<td>Discrete Math</td>
<td>4</td>
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<tr>
<td>PHY2413</td>
<td>Univ Physics 1</td>
<td>3</td>
</tr>
<tr>
<td>PHY2421</td>
<td>Univ Phys 1 Lab</td>
<td>1</td>
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#### Junior Year

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<td>MCS3663</td>
<td>Arch &amp; Assembler</td>
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<td>MCS3723</td>
<td>Advanced Calculus</td>
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<td>MCS3543</td>
<td>Data Base Sys</td>
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<td>MCS3863</td>
<td>Linear Algebra</td>
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#### Senior Year

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<tr>
<td>MCS3733</td>
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<td>MCS4813</td>
<td>Numerical Anal 1</td>
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<td>MCS4993</td>
<td>Topics in MCS</td>
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#### Mathematics Minor:

Students must take 29 credit hours of mathematics courses. Engineering students need only 9 additional credit hours because the engineering curriculum already requires 20 credit hours of mathematics.

#### Dual Major in Mathematics and Engineering:

Engineering students can earn a dual major in mathematics and engineering by completing 29 additional credit hours of math/computer science courses (9 courses) beyond the engineering requirements.

For more information about the mathematics program or to speak with an advisor, contact the Mathematics and Computer Science department at (248) 204-3560, e-mail to MCSCHAIR@LTU.EDU, or visit room S120 in the Science Building.
COLLEGE OF ARTS AND SCIENCES

BACHELOR OF SCIENCE IN CHEMISTRY

with Bio-Medical, Engineering Chemistry & Pre-Law Options
Total Semester Credit Hours: 121-127

BACHELOR OF SCIENCE IN ENVIRONMENTAL CHEMISTRY
Total Semester Credit Hours: 120

FRESHMAN YEAR (all Chemistry programs)

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<th>FIRST SEMESTER</th>
<th>Cr.</th>
<th>SECOND SEMESTER</th>
<th>Cr.</th>
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<td>Course No.</td>
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<td>CHM1233</td>
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<td>COM1103</td>
<td>English Comp</td>
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<td>CHM1232</td>
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<tr>
<td>CHM1213</td>
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<td>LLT1213</td>
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<tr>
<td>CHM1221</td>
<td>Univ Chem 1 Lab</td>
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<td>MCS1424</td>
</tr>
<tr>
<td>MCS1414</td>
<td>Calculus 1</td>
<td>4</td>
<td>SSC2423</td>
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<tr>
<td>SSC2413</td>
<td>Found Am Exper</td>
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<td><strong>Total Semester Credit Hours:</strong> 15</td>
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SOPHOMORE YEAR (except Engineering Chemistry)

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<th>Subject</th>
<th>Hrs.</th>
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<tbody>
<tr>
<td>CHM2313</td>
<td>Organic Chem 1</td>
<td>3</td>
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<td>CHM2342</td>
<td>Analytical Chem</td>
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<tr>
<td>CHM2352</td>
<td>Analytical Lab</td>
<td>2</td>
</tr>
<tr>
<td>PHY2413</td>
<td>Univ Physics 1</td>
<td>3</td>
</tr>
<tr>
<td>PHY2421</td>
<td>Univ Physics 1 Lab</td>
<td>1</td>
</tr>
<tr>
<td>MCS2414</td>
<td>Calculus 3</td>
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<tr>
<td><strong>Total Semester Credit Hours:</strong> 15</td>
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SOPHOMORE YEAR (Engineering Chemistry)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tbody>
<tr>
<td>CHM2313</td>
<td>Organic Chem 1</td>
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<td>EGE1102</td>
<td>Engr Comp App Lab</td>
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</tr>
<tr>
<td>LLT1223</td>
<td>World Masterpcs 2</td>
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</tr>
<tr>
<td>PHY2413</td>
<td>Univ Physics 1</td>
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</tr>
<tr>
<td>PHY2421</td>
<td>Univ Physics 1 Lab</td>
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<tr>
<td>MCS2414</td>
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<td>4</td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours:</strong> 17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes and options:

1. The advanced mathematics requirement, MCSXXX3, depends on the major chosen and on options chosen within the major. For the BS in Chemistry (ACS or Bio-medical) a student may choose either MCS2423 or MCS3403. For the BS in Environmental Chemistry or the Engineering Chemistry option within the Chemistry program, a student must take MCS2423 in order to satisfy the prerequisites for required engineering courses.

2. Some students, especially those selecting the Engineering Chemistry option may elect to take the required computer programming course (MCS1102 or MCS1142) as an additional course in the freshman or sophomore year.

3. Students majoring in Environmental Chemistry may elect to take PHY1173 in the freshman or sophomore year and delay one of the required LLTXXX3 or SSCXXX3 courses until the junior year.

For more information about the Chemistry programs or to speak with an advisor, contact the Natural Sciences department at (248) 204-3600, email to NCSCHAIR@ltu.edu or visit room S332 in the Science Building.

JUNIOR AND SENIOR YEARS

The order in which courses are taken in the final two years depends on the major, on options chosen within the major and on the student's year of entry. Not all courses are offered every year. It is essential that each student in any chemistry program meet with the Chair of Natural Science Department at the end of the sophomore year in order to map out a suitable plan of work for the junior and senior years. Several typical plans that take these issues into account are illustrated below. Part time students will develop customized plans of work in consultation with the Chair when they achieve sophomore standing.

Bachelor of Science in Chemistry: ACS Option

Plan A

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM3423; CHM3434; CHM3442; CHM3452; CHM3463; CHM4632; CHM4643; CHM4723; MCS1102 or MCS1142; 8 credits of chemistry electives and free electives (32 credits total)</td>
</tr>
<tr>
<td>SENIOR YEAR</td>
</tr>
<tr>
<td>CHM3403; CHM4522; CHM4542; COM2103; 21 credits of chemistry electives, social science electives and free electives (31 credits total)</td>
</tr>
</tbody>
</table>

Plan B

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM3403; CHM3434; CHM3442; CHM4522; CHM4542; MCS1102 or MCS1142; 14 credits of chemistry electives, social science electives and free electives (32 credits total)</td>
</tr>
<tr>
<td>SENIOR YEAR</td>
</tr>
<tr>
<td>CHM3452; CHM3463; CHM4632; CHM4643; CHM4723; COM2103; 15 credits of chemistry electives, social science electives and free electives (31 credits total)</td>
</tr>
</tbody>
</table>

Bachelor of Science in Chemistry: Bio-Medical Option

Plan A

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO1213; BIO1221; BIO1223; BIO1231; CHM3423; CHM3442; CHM4723; MCS1102 or MCS1142; 12 credits of chemistry electives, social science electives and free electives (31 credits total)</td>
</tr>
<tr>
<td>SENIOR YEAR</td>
</tr>
<tr>
<td>BIO2313; BIO2321; BIO2323; CHM3403; COM2103; 17 credits of chemistry elective, social science electives and free electives (30 credits total)</td>
</tr>
</tbody>
</table>

Plan B

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO1213; BIO1221; BIO1223; BIO1231; CHM3423; CHM3442; CHM3403; MCS1102 or MCS1142; 14 credits of chemistry electives, social science electives and free electives (31 credits total)</td>
</tr>
<tr>
<td>SENIOR YEAR</td>
</tr>
<tr>
<td>BIO2313; BIO2321; BIO2323; CHM3452; CHM4723; COM2103; 15 credits of chemistry electives, social science electives and free electives (30 credits total)</td>
</tr>
</tbody>
</table>
Bachelor of Science in Chemistry: Engineering Chemistry Option

### Plan A: Junior Year
- CHM3423; CHM3434; CHM3442; CHM3452; MCS1102 or MCS1142; EGE2013; EEE2123; EME3013; EME3043; 7 credits of chemistry electives, engineering electives, social science electives and free electives (32 credits total)

### Senior Year
- CHM3403; CHM4522; CHM4542; COM2103; EME3024; EME4013; EME4213; 13 credits of chemistry electives, engineering electives, social science electives and free electives (33 credits total)

### Plan B: Junior Year
- CHM3423; CHM3434; CHM3442; CHM3452; CHM4522; CHM4542; EGE2013; EME3043; 8 credits of chemistry electives, engineering electives; social science electives and free electives (33 credits total)

### Senior Year
- CHM3403; CHM3423; COM2103; MCS1102 or MCS1142; EEE2123; EME3024; EME4013; EME4213; 12 credits of chemistry electives, engineering electives; social science electives and free electives (33 credits total)

Bachelor of Science in Environmental Chemistry:

### Plan A: Junior Year
- CHM3423; CHM3434; CHM3442; CHM3452; CHM3463; CHM4632; MCS1102 or MCS1142; ECE3324; ECE3523; 6 credits of chemistry electives and free electives. (31 credits total)

### Senior Year
- CHM3383; CHM3403; CHM3601; CHM4522; CHM4542; COM2103; ECE4343; GLG1103; PHY1173; 6 credits of chemistry elective, social science electives and free electives (29 credits total)

### Plan B: Junior Year
- CHM3403; CHM3423; CHM3383; CHM3434; CHM3442; CHM3601; CHM4522; CHM4542; ECE3324; ECE3523; 3 credits of chemistry electives, social science electives and free electives. (30 credits total)

### Senior Year
- CHM3452; CHM3463; CHM4632; COM2103; ECE4343; GLG1103; MCS1102 or MCS1142; PHY1173; 9 credits of chemistry electives, social science electives and free electives (30 credits total)

### SUMMARY OF JUNIOR/SENIOR REQUIREMENTS IN CHEMISTRY

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<thead>
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<th>ACS Cert</th>
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<td>EME4213 Advanced Materials</td>
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<td>123</td>
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</table>

### Notes and Options:

1. Students choosing the bio-medical chemistry option or the engineering chemistry option must elect at least three semester credit hours of advanced laboratory instruction selected from CHM3463, CHM4542 and CHM4632.

2. The basic programming course will normally be either MCS1102 (Introduction to Fortran) or MCS1142 (Introduction to C). MCS1142 is strongly recommended.
CHEMISTRY MINOR: (Minimum of 20 hours)

Students must take a minimum of 20 credit hours in chemistry. Engineering students need 16 credit hours in addition to the required 4 credit hours of chemistry. Computer science students can complete a minor by choosing chemistry courses for the open elective courses in their curriculum. No additional credits are necessary.

Required Courses: (9 credit hours)

CHM1213 University Chemistry 1  CHM1223 University Chem 2
CHM1221 University Chem 1 Lab  CHM1232 University Chem 2 Lab

Chemistry Electives: (Minimum of 11 credit hours)

Selected from the following courses. All prerequisites and corequisites must be followed.

CHM2342 Analytical Chemistry  CHM3463 Adv Synthesis Lab
CHM2352 Analytical Chemistry Lab  CHM3503 Comp Appl in Chem
CHM3383 Environmental Chemistry  CHM3623 Intro to Polymer Chem
CHM3403 Biochemistry  CHM3723 Adv Organic Chemistry
CHM3423 Physical Chemistry 1  CHM4522 Advanced Spectroscopy
CHM3434 Physical Chemistry 2  CHM4542 Physical-Anal Lab 2
CHM3442 Physical-Anal Lab 1  CHM4632 Instrumental Anal Lab
CHM3452 Inter Inorganic Chemistry  CHM4643 Adv Inorg Chemistry

Examples of Sequences:

Organic Chemistry:  
(9+11 elect = 20 credit hours)  
(17 more hours for engineering students; 13 more for physics)

CHM2313 Organic Chemistry 1  CHM2327 Organic Chemistry 1 Lab
CHM2323 Organic Chemistry 2  CHM2332 Organic Chemistry Lab
CHM3403 Biochemistry

Polymer Chemistry:  
(9+11 elect = 20 credit hours)  
(17 more hours for engineering students; 13 more for physics)

CHM2313 Organic Chemistry 1  CHM2327 Organic Chemistry 1 Lab
CHM2323 Organic Chemistry 2  CHM2332 Organic Chemistry Lab
CHM3623 Intro to Polymer Chem

Biochemistry:  
(9+11 elect = 20 credit hours)  
(17 more hours for engineering students; 13 more for physics)

CHM2313 Organic Chemistry 1  CHM2327 Organic Chemistry 1 Lab
CHM2323 Organic Chemistry 2  CHM2332 Organic Chemistry Lab
CHM3403 Biochemistry

Physical Chemistry:  
(9+11 elect = 20 credit hours)  
(17 more hours for engineering students; 13 more for physics)

CHM3423 Physical Chemistry 1  CHM3434 Physical Chemistry 2
CHM3442 Physical-Anal Lab 1  CHM4522 Advanced Spectroscopy

Analytical Chemistry:  
(9+12 elect = 21 credit hours)  
(18 more hours for engineering students; 14 more for physics)

CHM2313 Organic Chemistry 1  CHM2327 Organic Chemistry 1 Lab
CHM2323 Organic Chemistry 2  CHM2332 Organic Chemistry Lab
CHM3442 Physical-Anal Lab 1  CHM2352 Analytical Chem Lab

Environmental Chemistry:  
(9+11 elect = 20 credit hours)  
(17 more hours for engineering students; 13 more for physics)

CHM2313 Organic Chemistry 1  CHM2327 Organic Chemistry 1 Lab
CHM2323 Organic Chemistry 2  CHM2332 Organic Chemistry Lab
CHM3383 Environmental Chem

CHEMISTRY AND ENGINEERING DUAL MAJOR

Students who take 46 additional chemistry credit hours can obtain a dual degree in chemistry and engineering. Please see the chemistry advisor for required and elective courses.

CHEMISTRY AND PHYSICS DUAL MAJOR

Students who take all of the required chemistry and physics courses in both majors can obtain a dual bachelor's degree in chemistry and physics. 30 additional credit hours are required beyond the first degree.

CHEMISTRY AND COMPUTER SCIENCE DUAL MAJOR

Students who take 30 additional chemistry credit hours can obtain a dual bachelor's degree in chemistry and computer science. Please see the chemistry advisor for required and elective courses.
# ASSOCIATE OF SCIENCE IN CHEMICAL TECHNOLOGY

**Total Semester Credit Hours: 61**

## FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr. Hrs.</th>
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<tbody>
<tr>
<td>COM1001</td>
<td>University Sem</td>
<td>1</td>
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<tr>
<td>COM1103</td>
<td>English Comp</td>
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<tr>
<td>CHM1213</td>
<td>University Chem 1</td>
<td>3</td>
</tr>
<tr>
<td>CHM1221</td>
<td>Univ Chem 1 Lab</td>
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</tr>
<tr>
<td>MCS1003</td>
<td>Intro Comp Appl</td>
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<td>MCS1214</td>
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## SECOND SEMESTER

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<tr>
<td>CHM1223</td>
<td>University Chem 2</td>
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<tr>
<td>CHM1232</td>
<td>Univ Chem 2 Lab</td>
<td>2</td>
</tr>
<tr>
<td>LLT1213</td>
<td>World Masterpcs 1</td>
<td>3</td>
</tr>
<tr>
<td>MCS1224</td>
<td>Intro Math Anal 2</td>
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</tr>
<tr>
<td>SSC2413</td>
<td>Found Amer Exp</td>
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## THIRD SEMESTER

<table>
<thead>
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<th>Course No.</th>
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<tr>
<td>CHM2313</td>
<td>Organic Chem 1</td>
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<td>CHM2342</td>
<td>Analytical Chem</td>
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<td>CHM2352</td>
<td>Analy Chem Lab</td>
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<tr>
<td>MCS1102</td>
<td>Intro to FORTRAN</td>
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</tr>
<tr>
<td>MCS2023</td>
<td>Statistical Meth</td>
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<td>SSC2423</td>
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**15**

## FOURTH SEMESTER

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<thead>
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<tbody>
<tr>
<td>CHM2323</td>
<td>Organic Chem 2</td>
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<td>CHM2332</td>
<td>Organic Chem Lab</td>
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<td>CHM2631</td>
<td>Instrumental Lab</td>
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<td>LLT1223</td>
<td>World Mast 2</td>
<td>3</td>
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<tr>
<td>PHY1154</td>
<td>Intro Phys Princ</td>
<td>4</td>
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<tr>
<td></td>
<td>Hum Elective</td>
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</tbody>
</table>

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For more information about the chemistry and chemical technology programs or to speak with an advisor, contact the Natural Sciences department at (248) 204-3600, e-mail to NCSCHAIR@LTU.EDU, or visit room S322 in the Science Building.
# Bachelor of Science in Physics

**with Industrial, Pre-Medical, Pre-Biomedical Engineering, & Pre-Law Options**

**Total Semester Credit Hours:** 120 (minimum)

# Bachelor of Science in Physics & Computer Science

**Total Semester Credit Hours:** 126

## Courses Common to Both Degrees

<table>
<thead>
<tr>
<th>Humanities Courses</th>
<th>Cr. Hrs.</th>
<th>Chemistry Courses</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1001 University Seminar</td>
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<td>CHM1213 Univ Chem 1</td>
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<tr>
<td>COM1103 English Composition</td>
<td>3</td>
<td>CHM1221 Univ Chem 1 Lab</td>
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</tr>
<tr>
<td>COM2103 Tech &amp; Prof Com</td>
<td>3</td>
<td>CHM1223 Univ Chem 2</td>
<td>3</td>
</tr>
<tr>
<td>LLT1213 World Masterpcs 1</td>
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<td>CHM1232 Univ Chem 2 Lab</td>
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</tr>
<tr>
<td>LLT1223 World Masterpcs 2</td>
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<td>LLTXXX3 Jr/Sr Elective</td>
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<tr>
<td>SSC2413 Foun of American Experience</td>
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<td>SSC2423 Dev of American Experience</td>
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<td>SSCXXX3 Elective</td>
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<tr>
<td>SSCXXX3 Jr/Sr Elective</td>
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</table>

## Math and Computer Courses

<table>
<thead>
<tr>
<th>Math and Computer Courses</th>
<th>Cr. Hrs.</th>
<th>Chemistry Courses</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS1102 Intro to FORTRAN</td>
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<tr>
<td>or MCS1142 Intro to C</td>
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<tr>
<td>MCS1414 Calculus 1</td>
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<tr>
<td>MCS1424 Calculus 2</td>
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<td>MCS2414 Calculus 3</td>
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<tr>
<td>MCS2423 Diff Equations</td>
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<tr>
<td>MCS3403 Prob &amp; Stat</td>
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<tr>
<td>MCS3863 Linear Algebra</td>
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## Physics Courses

<table>
<thead>
<tr>
<th>Physics Courses</th>
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</thead>
<tbody>
<tr>
<td>PSC1161 Phy Sci Seminar</td>
<td>1</td>
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<tr>
<td>PHY1173 Rad &amp; Env Phys</td>
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<td>PHY1181 Rad &amp; Env Phys Lab</td>
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<tr>
<td>PHY2413 Univ Phys 1</td>
<td>3</td>
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<tr>
<td>PHY2423 Univ Phys 1 Lab</td>
<td>1</td>
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<tr>
<td>PHY2431 Univ Phys 2</td>
<td>3</td>
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<tr>
<td>PHY2431 Univ Phys 2 Lab</td>
<td>1</td>
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<tr>
<td>PHY3513 Theor Mech 1</td>
<td>3</td>
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<tr>
<td>PHY3523 Theor Mech 2</td>
<td>3</td>
</tr>
<tr>
<td>PHY3574 Elect &amp; Magnetism</td>
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<tr>
<td>PHY3653 Cont Physics</td>
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<td>PHY3661 Cont Physics Lab</td>
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<td>PHY4724 Quantum Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHY4743 Optics, Lasers &amp; Microscopy</td>
<td>3</td>
</tr>
<tr>
<td>PHY4781 Optics, Lasers &amp; Microscopy Lab</td>
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<tr>
<td>PHY4843 Condensed Matter Physics</td>
<td>3</td>
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<tr>
<td>PHY4912 Physics Project 1</td>
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<tr>
<td>PHY4922 Physics Project 2</td>
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</tbody>
</table>

For more information about the physics programs or to speak with an advisor, contact the Natural Sciences department at (248) 204-3600, e-mail to NSCCHAIR@LTU.EDU, or visit room S322 in the Science Building.

With these electives and the approval of the department chairman, you may design your curriculum to meet your career goals. Below are suggested career options.

**Physics:** Physicists enter careers involving acoustics, computer and industrial research, geophysics, lasers and holography, nuclear physics, optical science, space science and astronomy, and meteorology.

**Pre-Medical:** You may design your studies for entry into medical or dental school and graduate studies in optometry, medical research, nuclear medicine, and medical imaging. Follow the suggested courses listed on page 64. See the department chairman for more details.

**Pre-Biomedical Engineering:** Physics with the appropriate electives is an excellent choice to prepare yourself for admission to graduate biomedical engineering programs. See the Special Programs page along with the pre-medical programs.

**Industrial Physics:** You may select courses in electrical and mechanical engineering or chemistry to design a program to meet your specific career goals in industry. See the department chairman for more details.

**Pre-Law:** See the suggested courses on page 64. Graduates in scientific fields are especially well prepared to study patent and corporate law. Scientifically educated people with law degrees are well suited to make reasoned judgments involving technical matters.
PHYSICS MINOR: (Minimum of 20 credit hours)

Required Courses: (12 credit hours)
PHY2413 University Physics 1
PHY2421 University Physics 1 Lab
PHY2423 University Physics 2
PHY3653 Contemporary Physics
PHY3661 Contemporary Phys Lab

Physics Minor Electives: (Minimum of 8 credit hours)
Selected from the following courses. All prerequisites and corequisites must be followed.
PHY2421 University Physics 1 Lab
PHY2423 University Physics 2
PHY3653 Contemporary Physics
PHY3661 Contemporary Phys Lab

GENERAL SCIENCES MINOR: (25 credit hours)
The following courses are required for a General Science minor.

BI01213 Biology 1
BI01223 Biology 2
CHM1213 University Chemistry 1
CHM1223 University Chemistry 2

One of the following Physics Sequences is required for the General Sciences minor.

PHY2413 University Physics 1
PHY2413 University Physics 2
OR
PHY2421 University Physics 1 Lab
PHY2431 University Phys 2 Lab

All prerequisites and co-requisites must be satisfied for these required courses. Those who wish to receive a certificate for this minor must apply to the Department of Natural Sciences, in room S322.

Examples of Sequences:

Radiation Physics:
(12+8 elect = 20 credit hours)
(12 more hours for Engr majors)
PHY1173 Radiation & Environ Phys
PHY1181 Radiation & Envi Phy Lab
PHY3513 Theoretical Mechanics 1
PHY3523 Theoretical Mechanics 2
PHY4724 Quantum Mechanics
PHY4743 Optics, Lasers & Micro
PHY4781 Opt, Lasers & Mic Lab
PHY4991 Directed Study in Phys

Mechanical Physics:
(12+10 elect = 22 credit hours)
(14 more hours for Engr majors)
PHY3513 Theoretical Mechanics 1
PHY3523 Theoretical Mechanics 2
PHY4743 Optics, Lasers & Micro
PHY4781 Opt, Lasers & Mic Lab

Electro-Optics Physics:
(12+8 elect = 20 credit hours)
(12 more hours for Engr majors)
PHY4743 Optics, Lasers & Micro
PHY4781 Opt, Lasers & Mic Lab
PHY4991 Directed Study in Phys
(projects in Condensed Matter Phys)

Quantum Physics:
(12+10 elect = 22 credit hours)
(14 more hours for Engr majors)
PHY4724 Quantum Mechanics
PHY4743 Optics, Lasers & Micro
PHY4843 Condensed Matter Phys

PHYSICS AND ENGINEERING DUAL MAJORS
Students who take 36 additional physics credit hours can obtain a dual degree in physics and mechanical engineering. Students who take an additional 32 physics credit hours may obtain a dual degree in physics and electrical engineering. Please see the physics advisor for required and elective courses.

PHYSICS AND CHEMISTRY DUAL MAJORS
Students must take all of the required chemistry and physics courses in both majors. If the student completes the physics major first, 30 additional chemistry credit hours are required. If chemistry is completed first, 23 additional physics credit hours are required. These additional hours apply only if appropriate electives are chosen.
DEPARTMENT OF
HUMANITIES,
SOCIAL SCIENCES AND
COMMUNICATION

PROFESSORS:
Gonzalo Munive (chairperson)
James S. Rodgers
Flumo Y. Stevens

ASSOCIATE PROFESSORS:
Harold Hotelling
Barry W. Knister
Douglass V. Koch, emeritus
Marvin Stern
Henrietta Nickels Shirk

ASSISTANT PROFESSORS:
Philip K. Vogt
Paula Stofer
Betty Stover
Melinda Weinstein

SENIOR LECTURERS:
Kevin A. Kelch
Corinne B. Stavish

LECTURERS:
Additional guest lecturers are assigned to selected courses and sections based on their specialties and expertise, and are listed in the faculty roster.

ADMINISTRATION

ACC2013 ACCOUNTING PRINCIPLES 1
Prerequisite: 0. Basic financial accounting principles for a business enterprise. The accounting cycle, merchandising accounts, asset valuation, income measurement, partnership accounting, and corporation accounting. Lect. 3 hrs. 3 hours credit

ACC2023 ACCOUNTING PRINCIPLES 2
Prerequisite: ACC2013. Completes the coverage of financial accounting principles and introduces management accounting. Investments, long-term liabilities, the statement of cash flow, consolidated statements, job-order and process cost accounting, special analysis for management, and standard costs. Lect. 3 hrs. 3 hours credit

ACC2053 INDIVIDUAL INCOME TAX
Prerequisite: Sophomore standing. In-depth study of the tax requirements imposed upon the employed individual by the federal, state, and city governments. Filing requirements, rates, types of return options available to individuals, estimated taxes, withholding requirements, personal deductions & exemptions, capital gains considerations and other material of concern to the employed individual. Lect. 3 hrs. 3 hours credit

ACC4093 INDEPENDENT STUDY IN ACCOUNTING
Prerequisites: Senior standing and faculty approval. Under the guidance of a faculty member, students conduct an intensive investigation of a topic within the field of accounting. A written proposal is required for approval. Projects typically include library research, interviews with operating and/or staff managers, and other requirements appropriate to the topic. One of the products of this project is a report. 3 hours credit

FIN3103 INTRODUCTION TO FINANCE MANAGEMENT
Prerequisites: ACC2023, MCS2113. Overview of the finance function of the firm, financial analysis, planning and budgeting, and the impact of alternative capital structures on the firm. Emphasis on understanding and utilizing present value and future value concepts. Lect. 3 hrs. 3 hours credit

FIN3113 INVESTMENT MANAGEMENT
Prerequisite: FIN3103. Investment opportunities and markets with emphasis on common stocks, bonds, and mutual funds. Reviews various approaches to evaluation and selection of investments. Investor assessment and portfolio management. Lect. 3 hrs. 3 hours credit

FIN4013 INVESTMENT INSTITUTIONS
Prerequisite: FIN3103. Evaluation of alternative sources of funds for the firm; short term debt, long term debt, preferred stock, and common stock. Examination of financial institutions including insurance companies, pension funds, banks, mutual funds, and the stock market. Lect. 3 hrs. 3 hours credit

FIN4013 FINANCIAL MANAGEMENT
Prerequisite: HRM3023. Review of the historical, legal, and societal forces which shape the present relationship between employers and employees represented by labor unions. After analyzing the bargaining positions of both parties, a simulation of an actual negotiation takes place. Lect. 3 hrs. 3 hours credit

FIN4033 HUMAN RESOURCES MANAGEMENT
Prerequisite: MGT2013. An understanding of and proposed solutions to human resources problems in an organization. Personnel testing, interviewing, personnel appraisals, training, management development and wage and salary administration. Lect. 3 hrs. 3 hours credit

HRM4013 EMPLOYEE-MANAGEMENT RELATIONS
Prerequisite: HRM3023. Review of the historical, legal, and societal forces which shape the present relationship between employers and employees represented by labor unions. After analyzing the bargaining positions of both parties, a simulation of an actual negotiation takes place. Lect. 3 hrs. 3 hours credit

HRM4033 HUMAN RESOURCE PROBLEMS AND POLICIES
Prerequisites: HRM3013, HRM3023. Readings and case analyses help examine current management thought and applications in a variety of personnel situations. Research project included. Lect. 3 hrs. 3 hours credit

HRM4093 INDEPENDENT STUDY IN HUMAN RESOURCES MANAGEMENT
Prerequisites: Senior standing and faculty approval. Under the guidance of a faculty member, students conduct an intensive investigation of a topic within the field of human resources. A written proposal is required for approval. The project typically includes library research, interviews with operating and/or staff managers, and other requirements appropriate to the topic. One of the products of this project is a report. 3 hours credit
MGT2113 INTRO TO BUSINESS LAW
Prerequisite: 0. Examination of the legal system and the framework for judicial decision making. An analysis of general principles of tort law and constitutional liberties and an examination of general concepts of business principles including contracts, sales, agency, partnerships, corporations, and property law. Lect. 3 hrs. 3 hours credit

MGT2203 MANAGEMENT AND SUPERVISION
Prerequisite: 0. The study of management and supervisory concepts from their theoretical bases through their practical applications. Students will be given opportunities to learn the art and science of management beginning at the supervisory level. There is an emphasis on ideas and their results. Exercises, case studies, and other real world examples are an important element of the learning experience. Lect. 3 hrs. 3 hours credit

MGT3043 ETHICAL ISSUES IN MANAGEMENT DECISION MAKING
Prerequisite: MGT2203. The interrelationships of managers and other segments of society owners and directors, employees and customers, labor unions and various governments. The ethics of decision-making and the priorities assigned to resource allocations which affect society. Lect. 3 hrs. 3 hours credit

MGT3051-3 MANAGEMENT INTERNSHIP 1
Prerequisites: Junior standing and college approval. Directed full work experience in the area of the students designated management major. Advisor approval required. Detailed written report and assigned readings required. (May be used as the equivalent of an independent study in management or be taken for elective credit. Hours of credit designated by last digit in the course number. The number of hours must be approved by the course advisor.) 1-3 hours credit

MGT4013 INTERNATIONAL BUSINESS
Prerequisites: MGT2203, FIN3103, MKT2013. Exploration of the multi-faceted topics necessary to develop and nurture the international dimension of business. Geography, cultural differences, (including religions), economics, politics, regional alliances, transportation modes, exchange mechanisms and rates, balance of payments, tariffs, quotas, assisting agencies, trade documents and agencies, and various options for entering foreign markets such as exporting, licensing and manufacturing. Lect. 3 hrs. 3 hours credit

MGT4051-3 MANAGEMENT INTERNSHIP 2
Prerequisites: MGT3053 and departmental approval. Direct full-time work experience in the area of the students designated management major. Advisor approval required. Detailed written report and assigned readings required. (May be used as the equivalent of an independent study in management or be taken for elective credit. Hours of credit designated by last digit in the course number. The number of hours must be approved by the course advisor.) 1-3 hours credit

MGT4093 INDEPENDENT STUDY IN MANAGEMENT
Prerequisites: Senior standing and faculty approval. Under the guidance of a faculty member, students conduct an intensive investigation of a topic within the field of management. A written proposal is required for approval. Projects typically include library research, interviews with operating and/or staff managers, and other requirements appropriate to the topic. One of the products of this project is a report. 3 hours credit

MGT4143 MANAGEMENT QUALITY CONTROL
Prerequisite: MCS2113. Issues of quality in the entire firm from a management perspective. Traditional quality control tools as well as various schools of thought on the subject of quality in the work place. (Required course for Operations Management and B.S.I.M. students.) Lect. 3 hrs. 3 hours credit

MGT4213 STRATEGIC MANAGEMENT
Prerequisites: Senior standing, MGT2203, FIN3103, MGT3013. The capstone course in the series of required management courses. Demonstrates how knowledge from various study areas contributes to the formulation of management policies and strategies. Case studies are used extensively. Lect. 3 hrs. 3 hours credit

MKT3013 PRINCIPLES OF MARKETING
Prerequisite: 0. The marketing concept, the marketing mix, target markets and the environment within which marketers work. The process of marketing is examined from the macro and micro views as well as from an international perspective. Lect. 3 hrs. 3 hours credit

MKT3023 SELLING AND SALES MANAGEMENT
Prerequisite: Junior standing. The selling function and its role in the business firm and our society. The selling process is studied, discussed, and practiced. Prospecting, the preapproach, the art of persuasion, making the sales presentation, handling objections, closing the sale, and servicing accounts after the sale. The management of the selling function. Lect. 3 hrs. 3 hours credit

MKT3073 TECHNICAL SALES
Prerequisites: None. Sales in the context of technologically advanced products and sophisticated buyers. Presentation, persuasion, contracting, and maintaining relationships in rapidly changing markets. Lect. 3 hrs. 3 hours credit

MKT4093 INDEPENDENT STUDY IN MARKETING
Prerequisites: Senior standing and faculty approval. Under the guidance of a faculty member, students conduct an intensive investigation of a topic within the field of marketing. A written proposal is required for approval. Projects typically include library research, interviews with operating and/or staff managers, and other requirements appropriate to the topic. One of the products of this project is a report. 3 hours credit

COMMUNICATIONS

COM0074 SUMMER WRITING WORKSHOP
Prerequisite: Placement. An intensive four and one-half week course focusing on basic reading and writing skills, grammar, sentence structure, paragraphing, essay organization, and revision. Structured as a workshop and much of the work in class will
include group writing and reading practice. Students who receive a grade of “C” or better will be placed into English Composition (COM1103). Lect. 3 hrs. 3 hours credit

COM0075 UNIVERSITY COMPOSITION 1
Prerequisite: Placement. First in a two-part intensive writing sequence. Principles of English Composition are emphasized, with a focus on writing short expository essays that follow the conventions for sentence structure, paragraphing, word choice and punctuation. Extensive writing and reading practice is required, as well as scheduled conferences with instructor. Lect. 5 hrs. 5 hours credit

COM0094 ENGLISH FUNDAMENTALS
Prerequisite: Placement. Principles of English composition are emphasized. Focus on basic writing skills, grammar, development of thesis statements, topic sentences, transitional words and phrases, supporting paragraphs, and essay organization. Extensive writing practice is required. Lect. 4 hrs. 4 hours credit

COM0104 ENGLISH FUNDAMENTALS FOR NON-NATIVE SPEAKERS
Prerequisites: Placement. A version of English Fundamentals designed to address the specific needs of non-native speakers of English. English grammar, usage and style. Extensive practice in basic writing skills and in the writing of essays. Lect. 4 hrs. 4 hours credit

COM1001 UNIVERSITY SEMINAR
Prerequisite: 0. Development of effective study skills including using textbooks, acquiring listening and note-taking skills, using library and computer resources, managing time, and preparing for and taking exams, and participating in group projects. Lect. 1 hr. 1 hour credit

COM1002 UNIVERSITY STUDIES SEMINAR
Prerequisites: None. Development of college-level study methods, including analysis of textbooks, listening and note-taking skills, library and computer abilities, and examination techniques. Short reading and writing assignments to familiarize the student with grading standards and procedures. Nature and role of universities in a diverse and computer-driven society. Replaces COM1001 for University Studies students. Lect. 2 hrs. 2 hours credit

COM1075 UNIVERSITY COMPOSITION 2
Prerequisite: COM0075. The second in a two-part intensive writing sequence. Fundamental skills of reading, reasoning, and writing are emphasized. Focuses on reading and analysis of literature and upon basic writing skills such as thesis, organization, support and development of ideas, and documentation. Expository essays and a research paper are required as well as scheduled conferences with the instructor. Lect. 5 hrs. 5 hours credit

COM1103 ENGLISH COMPOSITION
Prerequisite: Placement or COM0074, COM0094. The basic principles of English composition and the development of ideas in written work. Fundamentals of research techniques are emphasized. Extensive readings and frequent themes are required. Lect. 3 hrs. 3 hours credit

COM2103 TECHNICAL AND PROFESSIONAL COMMUNICATIONS
Prerequisite: COM1103 or COM1075. Training in a systematic method for producing effective technical communication, written reports, letters, and memos as well as oral presentations. Lect. 3 hrs. 3 hours credit

COM2113 SPEECH
Prerequisite: 0. Principles of individual and group speaking. Emphasis on group speaking situations and argumentative speaking. Lect. 3 hrs. 3 hours credit

COM2443 INTRODUCTION TO RHETORIC AND LOGIC
Prerequisite: COM2103. The origins of rhetoric and logic, with special emphasis on the discipline as a practical, productive art. Analysis of reasoning and fallacies; theory of logic and rhetoric; Venn diagrams and syllogisms. Critical examination of texts. Formal logic and rhetoric in oral and written presentations. Lect. 3 hrs. 3 hours credit

COM3103 ADVANCED PROFESSIONAL COMMUNICATION
Prerequisite: COM2103. Use of a variety of oral and written communication skills in various business and professional applications. Most course work done in groups. Use of computer technology and graphics. Lect. 3 hrs. 3 hours credit

COM3453 RESEARCH PRINCIPLES AND METHODS
Prerequisites: COM2103, COM2113. Examination of principles and methods of gathering information for technical and scientific research projects from print-based, computerized, and electronic resources (including the Internet), and from interviews. Bibliographic methods and accepted forms of documentation also introduced. Lect. 3 hrs. 3 hours credit

COM3493 TECHNICAL REPORT WRITING AND PRESENTATION
Prerequisites: COM2103, COM3453. Research report writing in technical fields. Students work independently and in small teams to learn how to write reports in standard report formats, analyze and use supporting data, and present research results for specialized audiences. Emphasis is on developing individual and team report writing and oral presentation skills. Lect. 3 hrs. 3 hours credit

COM3543 TECHNICAL EDITING
Prerequisite: COM2103. Application of technical editing skills, including substantive editing, copy editing, and proofreading. Editing text, visuals, and format for specialized audiences. Marking documents for publication. Lect. 3 hrs. 3 hours credit
COM3553 INTERPERSONAL AND NONVERBAL COMMUNICATION
Prerequisite: COM2103.
Overview of interpersonal communication and focus on relations in the professional world. Listening skills, nonverbal communication, language analysis, conflict management, and intercultural communication. Lect. 3 hrs. 3 hours credit

COM3573 PRINCIPLES OF INSTRUCTIONAL SYSTEMS
Prerequisite: COM2103. The systematic process of designing, producing, evaluating, and using instructional materials, such as manuals, for specialized audiences. Lect. 3 hrs. 3 hours credit

COM4113 INTERNSHIP OR SENIOR PROJECT
Prerequisite: Junior/Senior standing or permission of advisor. Under the supervision of an advisor, students apply knowledge gained in course work to a practical work environment, through an internship with a local company or a specially designed work project. Student’s progress evaluated through a log record, project or work portfolio, final report, and evaluation report. 3 hours credit

COM4123 INTERNSHIP OR SENIOR PROJECT 2
Prerequisite: COM4113. Continuation of COM4113. 3 hours credit

COM4133 MULTIMEDIA STUDIO
Prerequisites: COM2103, COM3473, COM3483. Study and application of multi-media hardware, software, and design techniques. Emphasis on design techniques, industry standards, and application in business and industrial environments. Use of a multi-media design package standard in the industry. Lect. 3 hrs. 3 hours credit

COM4143 DESKTOP PUBLISHING FOR WRITERS AND EDITORS
Prerequisite: COM2103. Application of the principles of document design using computerized desktop publishing software to produce print-based publications. Students work in groups to design and produce short print pieces (newsletter, brochure, etc.) for specialized audiences. Lect. 3 hrs. 3 hours credit

COM4153 WRITING PROPOSALS
Prerequisite: COM2103. The basic principles of writing proposals that seek organizational support and funding. Methods for identifying funding sources and analyzing the needs of the target audience. Students will prepare and critique their own and others’ proposals. Lect. 3 hrs. 3 hours credit

COM4953 COMPUTER-ASSISTED INSTRUCTION
Prerequisites: COM2103, COM3573. Application of the systematic process of designing, producing, evaluating, and using computer-assisted instructional materials, such as manuals, for specialized audiences. Using an authoring language to design and produce an instructional unit following the fundamental steps in the instructional design process and delivering it on a personal computer. Lect. 3 hrs. 3 hours credit

COM4964 SEMINAR IN COMMUNICATIONS
Prerequisites: COM2103, and Junior standing or permission of the program director. Intensive study of a technical communication topic as determined by the instructor. Assigned readings, written assignments, and group work culminating in a major project produced under the instructor’s guidance. Lect. 4 hrs. 4 hours credit

COM5963 WEB SITE DESIGN
Prerequisites: COM5103 or permission of instructor. A comprehensive introduction to the principles and practices of effective content and graphic design for web sites. Application of techniques and software tools for organizing web site information and for writing and editing texts presented in this digital communication medium. Students gain familiarity with the design process, including both the technical and usability factors that designers consider and apply in making decisions about information delivery via the web. Lect. 2 hrs., Lab 2 hrs. 3 hours credit

LANGUAGE AND LITERATURE

LLT1213 WORLD MASTERPIECES 1
Prerequisite: COM1103. Exploration of the great works of world literature and art in their historical contexts so that students may discover the variety and development of human thought and feeling in various cultures. Works of the Classical, Medieval, and Renaissance periods in Europe as well as Asian and Middle-Eastern works that have influenced the West, in the forms of poetry, drama, fiction, visual art, and music. A writing-intensive course requiring outside papers and essay tests. Approximately 80 percent of the course is devoted to the study of literature. Lect. 3 hrs. 3 hours credit

LLT2613 GERMAN 1
Prerequisite: 0. An introduction to basic German grammar and vocabulary includes easy reading and oral drill. No credit for LLT2613 without the completion of LLT2623. Lect. 3 hrs. 3 hours credit

LLT2623 GERMAN 2
Prerequisite: LLT2613. Further study of German grammar and vocabulary. Lect. 3 hrs. 3 hours credit

LLT2713 JAPANESE 1
Prerequisite: 0. Beginning study of the Japanese language, introducing the hiragana and katakana syllabaries and the acquisition of vocabulary, idiomatic phrases, and grammar. A survey of Japanese history to 1185 A.D. No credit for LLT2713 without the completion of LLT2723. Lect. 3 hrs. 3 hours credit

LLT2723 JAPANESE 2
Prerequisite: LLT2713. Continuation of the study of Japanese language and history, stressing completion of the hiragana syllabary and progress in the katakana syllabary. Continued acquisition of vocabulary, idiomatic phrases, and grammar. Lect. 3 hrs. 3 hours credit

LLT2913 SPANISH 1
Prerequisite: 0. An introduction to Spanish vocabulary and grammar; beginning reading and oral skills. No credit for LLT2913 without the completion of LLT2923. Lect. 3 hrs. 3 hours credit
COLLEGE OF ARTS AND SCIENCES

LTT2923 SPANISH 2
Prerequisite: LTT2913.
Continuation of Spanish vocabulary and grammar, with oral and written work. Aspects of Hispanic culture and civilization. Lect. 3 hrs. 3 hours credit

LTT3113 ENGLISH
LITERATURE TO 1800
Prerequisite: LTT1223. A survey of masterpieces of English poetry, prose, and drama from Beowulf through the late Middle Ages; the Elizabethan era; the 17th century, including the metaphysicals and Milton; the Neoclassical period; and the rise of the novel in the 18th century. Lect. 3 hrs. 3 hours credit

LTT3123 ENGLISH
LITERATURE 1800-1914
Prerequisite: LTT1223. A study of major Romantics (Blake, Wordsworth, Coleridge, Byron, Shelley, Keats). The second half takes up the crisis of conscience in society, art and religion that characterizes the Victorian period. Here, the emphasis falls on major non-fiction writers as well as poets. A Victorian novel may be included. Lect. 3 hrs. 3 hours credit

LTT3213 AMERICAN
LITERATURE TO 1900
Prerequisite: LTT1223. A survey of masterpieces of American poetry, prose, and drama from the early English settlers’ arrival to the 20th century. Lect. 3 hrs. 3 hours credit

LTT3223 AMERICAN
LITERATURE: 1900 TO PRESENT
Prerequisite: LTT1223. Great American essays, short stories, poetry, plays, and novels and their historical and cultural influences. Lect. 3 hrs. 3 hours credit

LTT3513 THE NOVEL
Prerequisite: LTT1223. A survey of the novel as an art form and as social history. Authors may range from Cervantes through Dickens, Flaubert, Joyce, Woolf, Faulkner, and Rushdie. Representative authors are chosen to illustrate particular narrative techniques as well as each period’s concerns. Lect. 3 hrs. 3 hours credit

LTT3523 WOMEN IN LITERATURE
Prerequisite: LTT1223. Literature by and about women from the classical period to the present. The rise of patriarchal society and its effects on culture. The significance of cultural changes, as reflected in literature, for women and society. Lect. 3 hrs. 3 hours credit

LTT3643 LITERATURE INTO FILM
Prerequisite: LTT1223. The metamorphosis of selected literature into film. Objective is to recognize the essence of each medium and to question the influence of literature and film on social and cultural thought. Lect. 3 hrs. Course fee. 3 hours credit

LTT3713 DRAMA:
HISTORY AND THEORY
Prerequisite: LTT1223. All aspects of the theater, including play content, historical development, staging, costume, make-up. Reading and performance of world drama; viewing and criticism of live productions. Lect. 3 hrs. 3 hours credit

LTT4113 EARLY SHAKESPEARE
Prerequisite: LTT1223. Shakespeare’s early career in its historical context. Church drama and the morality play are discussed as the tradition from which Renaissance theater developed. Representative works by the playwright’s contemporaries may be included. Emphasis on selected Shakespearean comedies, early tragedies and history plays to 1599. Lect. 3 hrs. 3 hours credit

LTT4123 LATER SHAKESPEARE
Prerequisite: LTT1223. The second half of Shakespeare’s career in its historical context. The playwright’s work as it changed from the period of the major tragedies early in the 17th century to the romances composed before his death in 1616. Works by later contemporaries may be included. Lect. 3 hrs. 3 hours credit

LTT4513 SEMINAR IN LITERATURE
Prerequisite: LTT1223 and Junior standing or permission of department chairperson. Intensive study of a literary topic determined by the instructor. Assigned readings and class discussion culminating in a major paper written under the instructor’s guidance. Lect. 3 hrs. 3 hours credit

LTT4523 CREATIVE WRITING
Prerequisite: LTT1223. The application of creative writing techniques through experimentation with various literary genres: poetry, fiction and drama, and critical evaluation. Lect. 3 hrs. 3 hours credit
LTT4533 LITERARY CRITICISM
Prerequisite: LTT1223. A historical approach to the examination of the classic texts of literary criticism with opportunities for students to apply the principles of criticism to selected literary works. Lect. 3 hrs. 3 hours credit

LTT4634 GERMAN 3
Prerequisite: LTT4623. A continuation of German language study, with emphasis on vocabulary development, pronunciation, reading and conversational skill. Lect. 4 hrs. 4 hours credit

LTT4734 JAPANESE 3
Prerequisite: LTT4723. Continued practice in spoken and written Japanese, with background from modern social and cultural history. Lect. 4 hrs. 4 hours credit

LTT4744 JAPANESE 4
Prerequisite: LTT4734. Continuing expansion of skills in spoken Japanese, combined with appropriate readings in Japanese literature and other aspects of Japanese culture. Lect. 4 hrs. 4 hours credit

LTT4833 SPANISH 3
Prerequisite: LTT4833. Review of essential grammatical structures and further training in spoken and written Spanish; introduction to Spanish literature. Lect. 3 hrs. 3 hours credit

LTT4843 SPANISH 4
Prerequisite: LTT4833. Development of oral and written proficiency, with emphasis on business and professional use; further study of Spanish literature. Lect. 3 hrs. 3 hours credit

LTT4903 SENIOR THESIS IN LITERATURE
Prerequisites: Permission of department chair. Supervised writing of an essay that demonstrates depth and breadth in the analysis of literature. Students will give a public presentation of their Senior Thesis. Lect. 3 hrs. 3 hours credit

LTT4913 MYTHOLOGY
Prerequisite: LTT1223. Examination of the origins and cultural significance of this oldest form of literature with emphasis on commonality of themes and continued influence in modern society. Readings in classical, Norse, Native American, and African myths. Lect. 3 hrs. 3 hours credit

LTT4923 MODERN WORLD LITERATURE
Prerequisite: LTT1223. Modern masterpieces of world literature and their influence on present social, cultural, and political thought. Lect. 3 hrs. 3 hours credit

LTT4991-3 DIRECTED STUDY IN LANGUAGE AND LITERATURE
Prerequisites: Permission of department chair. Study of a special topic under the direction of a member of the department. Lect. 3 hrs. 1-3 hours credit

LTT5991-3 DIRECTED STUDY IN LANGUAGE AND LITERATURE
Prerequisite: Permission of department chairman. Directed study with reports from students who wish to undertake individual readings and study on approved topics. 1-3 hours credit

PSYCHOLOGY

PSY1213 INTRODUCTORY PSYCHOLOGY
Prerequisite: 0. Introduction to the study of motives at work in human behavior: understanding of perception, reasoning, memory, consciousness, intelligence, psychopathology, and individual differences. Lect. 3 hrs. 3 hours credit

PSY3613 DEVELOPMENTAL PSYCHOLOGY
Prerequisite: PSY1213 or permission of instructor. The biological, cognitive, and personality changes that take place as a person ages and the causes of those changes. Lect. 3 hrs. 3 hours credit

PSY3623 SOCIAL PSYCHOLOGY
Prerequisite: PSY1213. The psychology of group behavior: the interaction between the psychological and social systems. Lect. 3 hrs. 3 hours credit

PSY3633 ABNORMAL PSYCHOLOGY
Prerequisite: PSY1213. The causes, symptoms and treatment of behavior disorders, personality disturbances, and mental illness. Lect. 3 hrs. 3 hours credit

SOCIAL SCIENCES

SSC1123 STATE AND LOCAL GOVERNMENT
Prerequisite: 0. The states in the federal system; state constitutions and problems of revision; functions and powers of the legislative, administrative and judicial branches of state government; state-local relations; state finance; trends and prospects. Lect. 3 hrs. 3 hours credit

SSC2303 PRINCIPLES OF ECONOMICS
Co-requisite: MCS0054 or equivalent. Survey of macroeconomics and microeconomics, with emphasis on fundamental tools of economic analysis and policy. Introduction of supply and demand, national income determination, theory of the firm, and market structure. Lect. 3 hrs. 3 hours credit

SSC2313 PRINCIPLES OF MACROECONOMICS
Co-requisite: MCS0054 or equivalent. Introduction to macroeconomics, including measurement of aggregate economic variables, determination of national income, Keynesian model, monetary and banking policy; international economics. Lect. 3 hrs. 3 hours credit

SSC2323 PRINCIPLES OF MICROECONOMICS
Prerequisite: SSC2313. Introduction to microeconomics, including utility theory, elasticity, theory of the firm, market structure, market failure, and regulatory policy. Lect. 3 hrs. 3 hours credit

SSC2413 FOUNDATIONS OF THE AMERICAN EXPERIENCE
Co-requisite: COM1103. Aspects of philosophy, political theory, science, art and religion, from ancient Egypt to 1789, as they have contributed to the formation of the American experience. Readings include selections from Plato, Aristotle, the Bible, Machiavelli, Hobbes, and other important thinkers. The student’s
ability to reflect critically upon the major ideas, values, institutions, events and personalities that have helped to shape the contemporary United States is emphasized. Seeks to foster an attitude of critical engagement and to develop students writing and oral skills through papers and class participation. Lect. 3 hrs. 3 hours credit

**SSC2423 DEVELOPMENT OF THE AMERICAN EXPERIENCE**
Prerequisite: SSC2413. A continuation of the study of philosophy, political theory, science, art and religion begun in Foundations of the American Experience. Discusses the framing of the United States Constitution in the late 18th century, and examines the works of important American thinkers and the important social documents of the 19th and 20th centuries. Both primary texts and selected readings in issues of contemporary importance are read. Develops students' writing and verbal skills through written assignments and class presentations. Lect. 3 hrs. 3 hours credit

**SSC3133 HISTORY OF EUROPE TO 1500**
Prerequisite: SSC2423. The development of European civilization from the Greeks to the Renaissance; analysis of the principal forces of change at work during this period. Lect. 3 hrs. 3 hours credit

**SSC3143 HISTORY OF EUROPE SINCE 1500**
Prerequisite: SSC2423. The emergence of modern Europe in its principal political, economic social, cultural and intellectual aspects. Lect. 3 hrs. 3 hours credit

**SSC3153 AMERICAN HISTORY TO 1877**
Prerequisite: SSC2423. The principal political, economic, social, and cultural factors which shaped colonial America and led to the American Revolution; the Constitution, westward expansion, the Civil War, and Reconstruction. Lect. 3 hrs. 3 hours credit

**SSC3163 AMERICAN HISTORY SINCE 1877**
Prerequisite: SSC2423. The United States since the end of Reconstruction. The Progressive Era, World War I, the Great Depression, World War II, the civil rights movement, the women’s movement, the Cold War and Vietnam, and the information age. Lect. 3 hrs. 3 hours credit

**SSC3173 AMERICAN POLITICAL TRADITION**
Prerequisite: SSC2423. The American political tradition and the men and women who made it. Readings on selected issues in American political history. Among topics included are: 18th-century republicanism, the origins of the Republican and Democratic parties, the history of political party systems, and the rise of the social welfare state in the 20th century. Selected issues in international relations, civil rights, and women’s contributions to the policy. Written assignments and classroom presentations required. Lect. 3 hrs. 3 hours credit

**SSC3183 AMERICAN INTELLECTUAL TRADITION**
Prerequisite: SSC2423. Major currents in American intellectual history. Students read selections from Ralph Waldo Emerson, William James, John Dewey and other thinkers in exploration of major paradigms in American intellectual history from the 17th to the 20th centuries. Among the philosophical issues examined are the Enlightenment and its critics, American transcendentalism, and American pragmatism. Written assignments and classroom presentations. Lect. 3 hrs. 3 hours credit

**SSC3253 GOLDEN AGE OF GREECE**
Prerequisite: SSC2423. The Greek Golden Age of the 5th century, B.C., emphasizing the philosophy, drama, architecture and sculpture, and daily life of Athens, viewed with the general historical and social conditions of the period. Lect. 3 hrs. 3 hours credit

**SSC3273 CONCEPTS OF HUMAN NATURE**
Prerequisite: SSC2423. The way in which man or human nature has been defined through the ages from the early Greek philosophers to modern interpretations. Special emphasis on modern psychological, philosophical, and religious thought with special emphasis on the rational and irrational bases of the scientific endeavor. Implications of such concepts for contemporary life. Lect. 3 hrs. 3 hours credit

**SSC3283 HISTORY OF MICHIGAN**
Prerequisite: SSC2423. A survey from prehistoric time to the present, with emphasis on Michigan in national and international contexts. Lect. 3 hrs. 3 hours credit

**SSC3313 HISTORY AND PHILOSOPHY OF SCIENCE**
Prerequisite: SSC2423. The history and development of scientific thought with special emphasis on the rational and irrational bases of the scientific endeavor. Lect. 3 hrs. 3 hours credit

**SSC3343 JAPANESE HISTORY AND CULTURE**
Prerequisite: SSC2423. An introductory examination of the major trends, issues, and forces of the study of the contemporary status of African-Americans; and a view of how they order their lives and define their futures through cultural, social, and political institutions and expressions. Lect. 3 hrs. 3 hours credit

**SSC3343 INTRODUCTION TO AFRICAN AMERICAN STUDIES**
Prerequisite: SSC2423. An introductory examination of the key aspects of the African-American experience in the United States, including: an historical survey of major trends, issues, and forces, a study of the contemporary status of African-Americans; and a view of how they order their lives and define their futures through cultural, social, and political institutions and expressions. Lect. 3 hrs. 3 hours credit

**SSC3353 ANTHROPOLOGY**
Prerequisite: Sophomore standing. Introduction to theory and methodology in social science and the role of culture in shaping human society; examination of cross-cultural diversity in belief systems, traditions, and material culture; and consideration of ethical problems in applied anthropology. Lect. 3 hrs. 3 hours credit

**SSC3383 INTERNATIONAL ECONOMICS**
Prerequisite: SSC2303 or SSC2313. International trade and finance. Gains from trade, barriers to trade, customs unions, technology transfer; currency exchange rates, international capital flows; balance of trade and balance of payments. Lect. 3 hrs. 3 hours credit

**SSC3413 INTRODUCTION TO AFRICAN AMERICAN STUDIES**
Prerequisite: SSC2423. A survey of the development of the Japanese people from historical and geographic analysis with emphasis on the social, political, economic, and educational life of Japan. Lect. 3 hrs. 3 hours credit

**SSC3513 INDUSTRIAL ECONOMICS**
Prerequisite: SSC2303 or faculty approval. A survey of the applied microeconomics of market structures, with particular reference to economies of scale, barriers to entry, market failure, antitrust, and regulation. Emphasis on industrial, retail, and nonfinancial service sectors. Lect. 3 hrs. 3 hours credit
SSC3523 MONEY AND BANKING
Prerequisite: SSC2503 or faculty approval. Monetary systems; in-depth analysis of the banking system in the United States with particular emphasis on expansion of money supply; assets and liability management and implications for investors and consumers. Lect. 3 hrs. 3 hours credit

SSC3713 TOPICS IN PHILOSOPHY
Prerequisite: SSC2423, LLT1223. Fundamental concepts and categories in metaphysics, philosophy of mind or epistemology; the different systems of thought of representative philosophers. Note: May be repeated for credit when topics vary. Lect. 3 hrs. 3 hours credit

SSC3723 ETHICS
Prerequisite: SSC2423. Various ethical systems; how ethical philosophy resolves conflicts rationally when automatic responses and implicit rules of action collide with contrary responses and rules. Lect. 3 hrs. 3 hours credit

SSC3733 AESTHETICS
Prerequisite: SSC2423. The origins and nature of aesthetic theory; bases of critical judgments in literature, drama, sculpture, architecture and music. Lect. 3 hrs. 3 hours credit

SSC4133 PROBLEMS IN INTERNATIONAL POLITICS
Prerequisite: SSC2423. Study of a significant problem area in international relations (e.g. NATO, the special relationship, terrorism), chosen each time of offering for its particular timeliness and relevance. Lect. 3 hrs. 3 hours credit

SSC4143 CONSTITUTIONAL LAW: INDIVIDUAL RIGHTS
Prerequisite: SSC2423. Our constitutional rights, including rights of the accused, freedom of speech and press, and freedom of religion. Lect. 3 hrs. 3 hours credit

SSC4513 SEMINAR IN SOCIAL SCIENCE
Prerequisite: Permission of department chairman. Intensive study of a topic determined by the instructor. Assigned readings and class discussion culminating in a major paper written under the instructor’s guidance. Lect. 3 hrs. 3 hours credit

SSC4643 WORLD RELIGIONS
Prerequisite: SSC2413 or permission of instructor. A study of the major religions of the world: Hinduism, Buddhism, Zoroastrianism, Islam, Judaism, and Christianity. Lect. 3 hrs. 3 hours credit

SSC4713 THE PHILOSOPHY OF SPACE EXPLORATION
Prerequisite: SSC2423. A philosophical investigation of the nature and value of space exploration. Standard arguments for and against exploration, the connection between science and technology, the serendipity of science, and the distinction between fundamental and applied science. Conceptual issues in comparative planetology space biology, and space physics and astronomy. Philosophical aspects of faster-than-light travel, human vs. machine exploration, space colonies, the likelihood of extraterrestrial intelligence, and the connection between space technology and war. Lect. 3 hrs. 3 hours credit

SSC4723 ENLIGHTENMENT AND REVOLUTION
Prerequisite: SSC2423. Study of the 18th-century Enlightenment and the revolutions that followed in America and France. Lect. 3 hrs. 3 hours credit

SSC4733 TOPICS IN THE HISTORY AND PROBLEMS OF TECHNOLOGY
Prerequisite: SSC2423. Investigation of the place and technology in society. Topics vary by semester, but may include the history of technology from ancient times to modern times. Emphasis on chronology, how events and ideas unfolded, in each of the five major categories of history. The panorama of seven centuries of intense excitement and change. Lect. 3 hrs. 3 hours credit

SSC4743 WORLD WAR I AND WORLD WAR II
Prerequisite: SSC2423. An investigation of the linkages in political, social, economic, and cultural history at the core of these two events. Cross-national emphases and materials are utilized. Looking at the wars as culminations of profound problems, and germinators of succeeding problems as well. Lect. 3 hrs. 3 hours credit

SSC4753 THE REFORMATIONS
Prerequisite: SSC2423. Study of the Protestant Reformation and Catholic Counter-Reformation of the 16th and 17th centuries, focusing on primary texts. Topics include the crisis of the Papacy, the Renaissance-Humanist critique of the Church, the failure of Conciliarism, the splintering of Protestantism and the Catholic revival. Lect. 3 hrs. 3 hours credit

SSC4763 ORIGINS OF MODERN BRITAIN
Prerequisite: SSC2423. An introduction to the political, social, economic, cultural, and religious history of England in modern times. Lect. 3 hrs. 3 hours credit

SSC4903 SENIOR THESIS IN SOCIAL SCIENCE
Prerequisites: Permission of department chair. Supervised writing of an essay that demonstrates depth and breadth of understanding of an issue in philosophy, history, economics or some other social science. Students will give a public presentation of their Senior Thesis. Lect. 3 hrs. 3 hours credit

SSC4991-3 DIRECTED STUDY IN SOCIAL SCIENCE
Prerequisite: Permission of department chair. Study of a special topic under the direction of a member of the department. Lect. 1-3 hrs. 1-3 hours credit

SSC5991-3 DIRECTED STUDY IN SOCIAL SCIENCE
Prerequisite: Permission of department chair. Study under direction of a member of the department on a special topic, for one to three credits as arranged and authorized by department chairman. 1-3 hours credit
COLLEGE OF ARTS AND SCIENCES

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

PROFESSORS:  
William C. Arlinghaus  
Thomas A. Lackey  
Richard E. Marburger, emeritus  
Zaven Margosian  
Roy W. Schenkel, emeritus

ASSOCIATE PROFESSORS:  
Glen A. Bauer  
David E. Bindschadler, (chairperson)  
Ruth G. Favro  
Sonia Henckel  
Pamela E. Lowry  
Michael J. Merscher  
James D. Nanny

ASSISTANT PROFESSORS:  
Chan-Jin Chung  
Ada C. Dong  
Gloria P. Rivkin  
John Stock, emeritus  
Glen A. Bauer  
Abdul Itani  
Ghassan M. Azar  
Sonia Henckel  
Ruth G. Favro  
Glen A. Bauer  
Abdul Itani  
Ghassan M. Azar  
Sonia Henckel  
Ruth G. Favro  
Glen A. Bauer

LECTURERS:  
Additional guest lecturers are assigned to selected courses and sections based on their specialties and expertise, and are listed in the faculty roster.

MCS0023 BASIC MATHEMATICS  
Prerequisite: 0. Fundamental operations of arithmetic, fractions, decimals, percentage, conversion of units, simple trigonometry, algebra, solving equations in one unknown, ratio and proportion. Lect. 3 hrs. 3 hours credit

MCS0035 ESSENTIAL MATHEMATICS  
Prerequisite: Placement or permission of department chair. Review of arithmetic operations as a basis for understanding algebraic operations. Algebra of exponents, polynomials, factoring and rational expressions. Solving linear equations and word problems. Graphing linear equations. Study skills, collaborative learning and lab work will be stressed. Lect. 5 hrs., Lab 3 hours 5 hours credit

MCS0040 COMPUTER WORKSHOP  
Prerequisite: 0. This hands-on workshop includes e-mail, windows, word processing, spreadsheets, database applications, power point, and an introduction to the Internet. Lab. 3 hrs. 0 hours credit

MCS0044 BASIC ALGEBRA  
Prerequisite: 0. Review of fractions, decimals, percentage, and absolute value. Algebra of exponents, polynomials, factoring, and rational expressions. Solving linear equations and word problems, and graphing of lines. Instruction will emphasize the development of math study skills and will include collaborative learning. Lect. 4 hrs., Lab 1 hr. 4 hours credit

MCS0054 INTERMEDIATE ALGEBRA/GEOMETRY  
Prerequisite: Placement, or MCS0023. Fundamental operations, factoring, exponents, radicals, linear equations, rectangular coordinates and graphing, systems of linear equations, introduction to quadratic equations, fundamental concepts and formulas of geometry. Students should keep the 5th hour in the same class period available for exams and study sessions. Lect. 4 hrs. 4 hours credit

MCS0074 PRECALCULUS  
Prerequisite: Placement. Quadratic equations, functions and graphs, systems of equations, theory of equations, inequalities, logarithms, trigonometric definitions, identities, equations. (This course is a faster-paced version of MCS0083 and MCS0093 combined. Students should keep the 5th hour in the same class period available for exams and study sessions.) Lect. 4 hrs. 4 hours credit

MCS0083 COLLEGE ALGEBRA  
Prerequisite: MCS0054 or placement. Covers that part of MCS0074 which does not involve trigonometry. Lect. 3 hrs. 3 hours credit

MCS0085 COLLEGE ALGEBRA AND ANALYTICAL GEOMETRY  
Prerequisite: MCS0035. Continuation of MCS0035. Quadratic equations, functions, graphs, systems of equations, theory of equations, inequalities. A faster paced course than MCS0055. Successful completion prepares the student for MCS0093 Trigonometry. Lect. 5 hrs., Lab 3 hours 3 hours credit

MCS0093 TRIGONOMETRY  
Prerequisite: MCS0083 or placement. Covers that part of MCS0074 involving trigonometry and logarithms. Lect. 3 hrs. 3 hours credit

CALCULUS SEQUENCE PLACEMENT

The results of a student’s placement assessment in mathematics will determine which course the student will take. The following chart is only a guideline for judging where students might expect to be placed.

<table>
<thead>
<tr>
<th>High School Background</th>
<th>Expected first semester</th>
<th>Expected second semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 units Algebra, 1 unit Geometry, 0.5 unit Trig.</td>
<td>MCS1414 Calculus 1</td>
<td>MCS1424 Calculus 2</td>
</tr>
<tr>
<td>2 units Algebra, 1 unit Geometry</td>
<td>MCS0093 Trig.</td>
<td>MCS1414 Calculus 1</td>
</tr>
<tr>
<td>1.5 units Algebra, 1 unit Geometry</td>
<td>MCS0074 Pre-calc.</td>
<td>MCS1414 Calculus 1</td>
</tr>
<tr>
<td>1 unit Algebra, 1 unit Geometry</td>
<td>MCS0054 Intermed. Algebra/Geometry</td>
<td>MCS0074 Pre-calc.</td>
</tr>
<tr>
<td>1 unit Algebra</td>
<td>MCS0054 Intermed. Algebra/Geometry</td>
<td>MCS0083 College Algebra</td>
</tr>
</tbody>
</table>

the students solve them individually and in group sessions. Upon successful completion of the workshop, students will receive a new placement in mathematics. Lab. 4 hrs. 0 hours credit
MCS1003 INTRODUCTION TO COMPUTER APPLICATIONS
Prerequisite: 0. Introduction to applications involving use of a computer. E-mail, word processing, spreadsheets, data base applications, introduction to computer graphics. (This course or a programming course is required of those who do not successfully demonstrate knowledge of these topics upon entry to Lawrence Tech. No credit for mathematics/computer science majors.) Lect. 3 hrs. 3 hours credit

MCS1023 TECHNICAL COMPUTER APPLICATIONS
Prerequisite: 0. Introduction to computers and computer programming using the C language. Lotus 1-2-3 software will be utilized for a portion of the course. Assigned problems to be programmed on the University’s mainframe and microcomputer facilities. (For engineering technology students only.) Lect./Lab. 3 hrs. 3 hours credit

MCS1102 INTRODUCTION TO FORTRAN
Co-requisite: MCS0074, MCS0083, MCS1214, or high school equivalent. Introduction to programming in FORTRAN. Assignment statements, choice of alternatives, arrays, loops, introduction to subroutines. Lect. 2 hrs. 2 hours credit

MCS1113 TECHNICAL MATHEMATICS 1
Prerequisite: 1 year algebra, placement, or MCS0023. Fundamental operations, functions and graphs, trigonometric functions with right angle applications, systems of linear equations, factoring, fractions, quadratic equations, rational measure, general trigonometric functions. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

MCS1123 TECHNICAL MATHEMATICS 2
Prerequisite: MCS1113. Vectors, oblique triangles, graphs of trigonometric functions, exponents, radicals, logarithms, determinants, matrices. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

MCS1142 INTRODUCTION TO C
Co-requisite: MCS0074, MCS0083, or high school equivalent. An introduction to the C programming language: arrays, functions, file operations, and simple pointer types. Lect. 2 hrs. 2 hours credit

MCS1203 LOGIC
Prerequisite: Placement. Introduction to deductive and inductive logic. Aristotelian logic, truth functions and truth tables, formal deductions, analysis of fallacies, inductive reasoning. Matrices, introduction to probability. (No credit for mathematics/computer science majors.) Lect. 3 hrs. 3 hours credit

MCS1214 INTRODUCTION TO MATHEMATICAL ANALYSIS 1
Prerequisite: Placement or MCS0054. Equations and inequalities, functions and graphs, lines, parabolas, systems of equations, exponential and logarithmic functions, mathematics of finance, matrix algebra, linear programming. Lect. 4 hrs. 4 hours credit

MCS1224 INTRODUCTION TO MATHEMATICAL ANALYSIS 2
Prerequisite: Placement, MCS1214 or MCS0083. Limits and continuity, differentiation, curve sketching, applications of differentiation, integration, methods of applications of integration, multivariable calculus. Lect. 4 hrs. 4 hours credit

MCS1254 GEOMETRY IN ART
Prerequisite: Placement or MCS0054. Diverse geometrical applications of mathematical concepts, linking the symbolic representation to the visual representation. Examples from the arts and architecture; computer applications. Topics covered may include conic sections, perspective, symmetry, tilings, shading of objects, fractals. Lect. 4 hrs. 4 hours credit

MCS1311 CALCULUS 1A
Prerequisite: Placement, MCS0074, or MCS0083 and MCS0093. Limits and continuity, differentiation of algebraic and trigonometric functions. Course covers the same materials as the first five weeks of Calculus 1, MCS1414. (Credit cannot be earned for both this course and MCS1414.) Lect. 4 hrs., 1 hour credit

MCS1312 CALCULUS 1B
Prerequisite: Placement from MCS1311. Higher derivatives, related rates, linear approximations, max-min problems, graphing, antiderivatives, parametric equations. Course covers the same material as the second five weeks of Calculus 1, MCS1414. (Credit cannot be earned for both this course and MCS1424.) Lect. 4 hrs. 1 hour credit

MCS1332 CALCULUS 1C
Prerequisite: Placement from MCS1311 or MCS1321. Areas, definite integral, fundamental theorem of calculus, indefinite integral, applications of integration. Course covers the same material as the final five weeks of Calculus 1, MCS1414. The final exam for this course also covers material from MCS1311 and MCS1321. (Credit cannot be earned for both this course and MCS1414.) Lect. 4 hrs., 2 hours credit

MCS1341 CALCULUS 2A
Prerequisite: Placement from MCS1424 or MCS1341. Integration techniques, improper integrals, applications of integration. Covers the same material as the second five weeks of Calculus 2, MCS1424. (Credit cannot be earned for both this course and MCS1424.) Lect. 4 hrs. 1 hour credit

MCS1351 CALCULUS 2B
Prerequisite: Placement from MCS1424 or MCS1351. Sequences, infinite series, convergence tests, absolute convergence, Taylor series, applications. Covers the same material as the third five weeks of Calculus 2, MCS1424. The final exam for this course also covers material from MCS1341 and MCS1351. (Credit cannot be earned for both this course and MCS1424.) Lect. 4 hrs. 2 hours credit

MCS1362 CALCULUS 2C
Prerequisite: Placement from MCS1424 or MCS1351. Integration techniques, improper integrals, applications of integration. Covers the same material as the second five weeks of Calculus 2, MCS1424. The final exam for this course also covers material from MCS1341 and MCS1351. (Credit cannot be earned for both this course and MCS1424.) Lect. 4 hrs. 2 hours credit

MCS1414 CALCULUS 1
Prerequisite: Placement, MCS0074, or MCS0083 and MCS0093. Limits and continuity, differentiation of algebraic and trigonometric functions, mean value theorem, applications of differentiation, antiderivatives, indeterminate integrals, substitutions, definite integrals, the Fundamental Theorem of Calculus, applications of integration. Lect. 4 hrs. 4 hours credit
MCS1424 CALCULUS 2
Prerequisite: MCS1414. Calculus of transcendental functions, l'Hôpital's rule, techniques of integration, application to arc length and surface area, infinite series. Lect. 4 hrs. 4 hours credit

MCS1514 COMPUTER SCIENCE 1
Prerequisite: MCS1102 or MCS1142 or MCS1603 or programming experience.
Introduction to computer science. Simple, iterative, and conditional statements. Enumerated variable types, procedures and functions, single and multidimensional arrays, bubble sort, linear search, simple file input/output (sequential). Lect. 3 hrs. Lab. 1 hr. 4 hours credit

MCS1603 COBOL
Prerequisite: MCS1003.
Introduction to COBOL programming; the study of the COBOL language and business applications. Sequential, random, and indexed file design and processing, keying schemes, subroutines, and the COBOL library facility. Emphasis on structured programming. Lect. 3 hrs. 3 hours credit

MCS1623 INTRODUCTION TO VISUAL BASIC
Prerequisite: MCS1003. Visual Basic integrated development environment (IDE) and its wealth of development tools, the use of the debugging and testing tools available in Visual Studio, business applications, design strategy for maintainability and reusability, building effective user interfaces with Visual Basic controls, forms, and other GUI components, Database access. Lect. 3 hrs. 3 hours credit

MCS2023 STATISTICAL METHODS
Prerequisite: MCS1123 or MCS2124. Introduction to the theory of statistics and some of its applications, use of mathematical models to predict outcomes, data representation, probability, sampling theoretical distributions, estimating, correlation, time series, number usage. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

MCS2113 STATISTICS 1
Prerequisite: MCS1224 or MCS2313. Frequency distributions, descriptive measures of populations and samples, probability, discrete and continuous probability distributions, payoff tables, Bayes' theorem, decision theory. Lect. 3 hrs. 3 hours credit

MCS2123 STATISTICS 2
Prerequisite: MCS2113. The central limit theorem, estimation of means, hypothesis testing, goodness of fit, regression and correlation analysis, statistical computer software. Lect. 3 hrs. 3 hours credit

MCS2213 TECHNICAL CALCULUS
Prerequisite: MCS1123. Introduction to plane analytic geometry, basic concepts of calculus, derivatives of simple functions, tangents, curve sketching, indefinite and definite integrals. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

MCS2313 TECHNICAL CALCULUS
Prerequisite: MCS1123. Introduction to plane analytic geometry, basic concepts of calculus, derivatives of simple functions, tangents, curve sketching, indefinite and definite integrals. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

MCS2323 APPLIED DIFFERENTIAL EQUATIONS
Prerequisite: MCS1023 and MCS2313. Introduction to differential equations, differential equations with initial values, numerical methods. The computer is used as a tool throughout the course. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

MCS2414 CALCULUS 3
Prerequisite: MCS1424. Polar coordinates, three-dimensional analytic geometry. Vectors, vector-valued functions, motion in space, functions of several variables, partial differentiation, multiple integrals, integration in vector fields. Lect. 4 hrs. 4 hours credit

MCS2423 DIFFERENTIAL EQUATIONS
Prerequisite: MCS2414. Ordinary differential equations including principal types of first order equations. Techniques of solution of higher order linear equations with constant coefficients. Applications of first order and higher order equations. Introduction to Laplace transforms. Systems of linear differential equations. Lect. 3 hrs. 3 hours credit

MCS2513 P.R. COMPUTER SCIENCE
Prerequisite: Restricted to students in the Pacific Rim program. Programming. Simple, iterative and conditional statements. Data types, procedures, and functions. Arrays. File input/output. Classes and methods. Introduction to data structures, linked lists, trees, queues. Sorting and searching. Lect. 4 hrs. 3 hours credit

MCS2514 COMPUTER SCIENCE 2
Prerequisite: MCS1514. Records, advanced file input/output (random access), dynamic memory allocation. Static and dynamic implementation of stacks, linked lists (ordered and unordered), queues (regular and priority), circular queues. Selection and insertion sort, binary search. Lect. 3 hrs., Lab. 1 hr. 4 hours credit

MCS2523 P.R. DISCRETE MATHEMATICS
Prerequisite: Restricted to students in the Pacific Rim program. Logic, sets and functions. Algorithms, the integers and matrices. Mathematical reasoning. Basic counting techniques, permutations, combinations, recurrence relations, inclusion-exclusion. Equivalence relations. Graphs, connectivity, Eulerian and Hamiltonian paths, trees, spanning trees. Boolean algebra. Lect. 4 hrs. 4 hours credit

MCS2533 P.R. DATA STRUCTURES
Prerequisite: Restricted to students in the Pacific Rim program. Continuation of data structures. Analysis of algorithms, big Oh notation, asymptotic behavior. Advanced sorting, external sorting. Binary, multiway and AVL trees. Lect. 4 hrs. 4 hours credit

MCS2534 DATA STRUCTURES
Prerequisite: MCS2514. Analysis of algorithms, Big Oh notation, asymptotic behavior. Advanced sorting (heapsort, quicksort), external sorting. Binary, multiway, and AVL trees. Lect. 4 hrs. 4 hours credit
MCS2613 C
Co-requisite: MCS2514.
Programming using the C language. Emphasis on functions, pointers, arrays, and structures. Bitwise expressions, the preprocessor, storage classes, ragged arrays. Lect. 3 hrs. 3 hours credit

MCS3403 PROBABILITY AND STATISTICS
Prerequisite: MCS2414.
Representation of data, probability, random variables, the binomial distribution, continuous probability models, sampling theory, central limit theorem, confidence intervals, tests of statistical hypotheses, regression analysis. Lect. 3 hrs. 3 hours credit

MCS3413 ADVANCED ENGINEERING MATHEMATICS
Prerequisite: MCS2423.
Laplace transforms of continuous and piecewise continuous functions, inverse Laplace transforms, applications to ordinary differential equations. Complex variables, analytic functions, Laurent expansions, residue theory with applications, complex integral and convolution integral. Lect. 3 hrs. 3 hours credit

MCS3513 ASSEMBLER
Prerequisite: MCS2514.
Machine and assembly language programming. Addressing modes, macros, and subroutines. Lect. 3 hrs. 3 hours credit

MCS3523 MATHEMATICAL MODELLING
Prerequisites: MCS1102; MCS3403 or MCS2123.
Building mathematical and computer models of various systems, including queueing systems. Discrete event simulation. Lect. 3 hrs. 3 hours credit

MCS3543 INTRODUCTION TO DATABASE SYSTEMS
Prerequisite: MCS1514 or one programming language and MIS3013.
Organization of database systems. Data definition, retrieval, manipulation. Relational data bases, SQL. Practice using standard databases. Lect. 3 hrs. 3 hours credit

MCS3563 COMPUTER ARCHITECTURE
Prerequisite: MCS3513.
Detailed study of the organization and structure of modern computer systems. Lect. 3 hrs. 3 hours credit

MCS3633 INTRODUCTION TO FUNCTIONAL PROGRAMMING
Prerequisite: MCS1514.
Introduction to functional programming. Induction and recursion, symbolic computation, higher-order functions, polymorphism, data abstraction and modularity, invariants, demand-driven programming, exception handling, and computability. Lect. 3 hrs. 3 hours credit

MCS3743 COMPLEX ANALYSIS
Prerequisite: MCS2423.
Complex variables, analytic functions, Cauchy-Riemann equations, Laurent expansions, contour integration, residue theory. Lect. 3 hrs. 3 hours credit

MCS3863 LINEAR ALGEBRA
Prerequisite: MCS2414.
Systems of linear equations, matrices, determinants, eigenvalues, eigenvectors. Finite-dimensional vector spaces, linear transformations and their matrices, Gram-Schmidt orthogonalization, inner product spaces. Lect. 3 hrs. 3 hours credit

MCS4623 INTRODUCTION TO SOFTWARE ENGINEERING
Prerequisite: MCS2514.
Introduction to software engineering emphasizing technical concepts, team management, and product performance. Analysis, design, implementation, verification, validation, and maintenance of software. Lect. 3 hrs. 3 hours credit

MCS4643 INTRODUCTION TO C++ PROGRAMMING
Prerequisite: MCS1514.
Introduction to C++ programming. Topics include objects, classes, inheritance, polymorphism, exception handling, and object-oriented programming. Lect. 3 hrs. 3 hours credit
MCS4633 ARTIFICIAL INTELLIGENCE
Prerequisite: MCS2534.
Introduction to artificial intelligence. Knowledge representation and acquisition, decision trees, logic programming, non-deterministic and non-algorithmic problem solving, forward and backward chaining, symbol processing, predicate logic. Expert systems.
Lect. 3 hrs. 3 hours credit

MCS4643 COMPARATIVE PROGRAMMING LANGUAGES
Prerequisites: MCS2534, MCS3613. A survey of different types of programming languages done by comparing and contrasting the underlying concepts of their design and use. Information hiding, data abstraction, modularity. Languages include C, Pascal, Ada, and LISP.
Lect. 3 hrs. 3 hours credit

MCS4653 THEORY OF COMPUTATION
Prerequisite: MCS2524.
Beginning course on theory of computation. Regular languages, finite automata, context-free languages, Turing Machine, Chomsky hierarchy, applications to parsing.
Lect. 3 hrs. 3 hours credit

MCS4663 OPERATING SYSTEMS
Prerequisite: MCS3653.
Principles of operating systems. Storage management, interrupts, paging, swapping, protection, file management.
Lect. 3 hrs. 3 hours credit

MCS4813 NUMERICAL ANALYSIS 1
Prerequisite: MCS1102, MCS2423. Approximation and error. Roots of equations, approximation of algebraic and transcendental functions, differentiation, indefinite and definite integration. Quadrature, interpolation.
Lect. 3 hrs. 3 hours credit

MCS4823 NUMERICAL ANALYSIS 2
Prerequisite: MCS4813.
Numerical techniques for the solution of ordinary differential equations, matrix exponential computations, matrix inversion. Selected topics.
Lect. 3 hrs. 3 hours credit

MCS4833 SENIOR PROJECT
Prerequisite: Permission of department chairman.
Intensive study of special problems in software system development. Students participate in specifying, designing, developing, coding, and testing of complex software systems. Emphasis on team development of projects.
Lect. 3 hrs. 3 hours credit

MCS4863 MODERN ALGEBRA
Prerequisite: MCS3863.
Introduction to algebraic systems. Groups, homomorphisms, isomorphisms, subgroups, normal subgroups, factor groups, rings and ideals, integral domains, fields. The real number system.
Lect. 3 hrs. 3 hours credit

MCS4981 DIRECTED STUDY IN MATH/COMPUTER SCIENCE
Prerequisite: Permission of department chair. By arrangement.
1 hour credit

MCS4982 DIRECTED STUDY IN MATH/COMPUTER SCIENCE
Prerequisite: Permission of department chair. By arrangement.
2 hours credit

MCS4983 DIRECTED STUDY IN MATH/COMPUTER SCIENCE
Prerequisite: Permission of department chair. By arrangement.
3 hours credit

MCS4993 TOPICS IN MATH/COMPUTER SCIENCE
Prerequisite: Permission of department chairman.
Topics of current interest in mathematics and computer science. (May be taken more than once if the topic is different.)
Lect. 3 hrs. 3 hours credit

MCS5003 ESSENTIALS OF COMPUTER SCIENCE
Prerequisite: Approximately five years of professional software development. Concepts of computer science for the experienced software developer. Topics from MCS1514, MCS2514, MCS2524, MCS2534, and MCS3663 are highlighted.
Lect. 3 hrs. 3 hours credit

MCS5013 WEB PROGRAMMING
Prerequisite: MCS2534
Introduction to the Web-server basis; Web authoring using HTML; Advanced Web authoring with dynamic HTML, XML; JavaScript programming; CGI programming in C, C++, and Perl. Introduction to ASP and the middle tier.
Lect. 3 hrs. 3 hours credit

MCS5023 JAVA PROGRAMMING
Prerequisite: MCS3603 or permission of department chair.
Lect. 3 hrs. 3 hours credit

MCS5033 OBJECT COMPUTING
Prerequisite: MCS2534.
Introduction to the fundamental concepts of building reusable software components and applications using COM and DCOM architecture. Programming with COM.

MCS5043 PROGRAMMING LANGUAGE IMPLEMENTATION
Prerequisites: MCS2534, MCS4653, and MCS3633.
Substantial programming experience is required. Issues associated with the design and implementation of higher-level programming languages. Concentrations are theory behind different components of a compiler, programming techniques used to put the theory into practice, and the interfaces used to modularize the compiler. Course project on compiler design and implementation.
Lect. 3 hrs. 3 hours credit

MCS5053 COMPUTABILITY
Prerequisite: MCS2534 or MCS4653.
The second course on theory of computation. Introduces decidability, computability, and computational complexity. Church’s Thesis; undecidability; reducibility and completeness; recursive functions; time complexity and NP-completeness.
Lect. 3 hrs. 3 hours credit

MCS5083 VISUAL PROGRAMMING
Prerequisite: MCS2534.
Lect. 3 hrs. 3 hours credit
MCS5103 SOFTWARE ENGINEERING  
Prerequisite: Permission of department chair. Selection of programming language; debugging techniques and tools; program maintenance; software economics; team programming and its application to projects; software life cycle. Lect. 3 hrs. 3 hours credit

MCS5203 INTRODUCTION TO COMPUTER GRAPHICS  
Prerequisite: MCS3503. Introduction to fundamental computer graphics issues, hardware, algorithms, and software. Scan-conversion line generators; scan-line polygon; affine transformation; viewing and clipping; illumination and rendering; solid modeling; curves and surfaces; texture mapping; collision detection; animation; issues of virtual environments applications. Lect. 3 hrs. 3 hours credit

MCS5213 COMPUTATIONAL GEOMETRY  
Prerequisites: MCS2414, MCS3503. Implicit and explicit representations of curves in the plane; vectors and transformations; curves and surfaces in space. Splines and other representations. Computational issues in intersection, minimum distance, edge detection and projection algorithms. Lect. 3 hrs. 3 hours credit

MCS5223 COMPUTER AIDED GEOMETRIC DESIGN  
Prerequisite: MCS213. Bezier and NURBS representations of curves and surfaces. Properties of B-Splines and resulting algorithms. Designing curves and surfaces. Issues surrounding topology, trimmed surfaces and triangulation. Other representations. Lect. 3 hrs. 3 hours credit

MCS5223 INTRODUCTION TO THEORY OF COMPUTATION  
Prerequisite: MCS2524. A beginning course on theory of computation. Regular languages; finite automata; context-free languages; turing machine; Chomsky hierarchy; applications to parsing. Lect. 3 hrs. 3 hours credit

MCS5303 INTRODUCTION TO DATABASE SYSTEMS  
Prerequisite: Permission of department chair. Design and implementation of relational, hierarchical and network database systems. Query/update data languages, conceptual data model, physical storage methods, database system architecture and normal forms. Database security and integrity. Relational database systems are emphasized. A project involving an on-line database system is normally assigned. No credit given after MIS6113. Lect. 3 hrs. 3 hours credit

MCS5403 ROBOTICS PROGRAMMING  
Prerequisite: MCS2534. Characteristics of real-time computing. Introduction to robotics, control theories, modeling finite state machines, design methodologies for real-time systems, process synchronization using semaphores, Lego robots and developing robot programs using various programming languages and different real-time operating systems for autonomous mobile robots such as Khepera and Lego RIS. Lect. 3 hrs. 3 hours credit

MCS5523 VIRTUAL ENVIRONMENT AND SCIENTIFIC VISUALIZATION  
Prerequisite: Technical proficiency in one of: architecture design, programming, modeling, or painting. A project based hands-on course. Teams with members of varied backgrounds build immersive virtual worlds to solve real world scientific visualizations problems. Lect. 3 hrs. 3 hours credit

MCS5703 INTRODUCTION TO DISTRIBUTED COMPUTING  
Prerequisite: Permission of department chair. Introduction to data communications, network models, topologies and structures. Includes the OSI model, transport mediums (routers, bridges, gateways), and an overview of communication protocols, particularly TCP/IP. Lect 3 hrs. 3 hours credit

MCS3101 CO-OP PRACTICUM I  
Prerequisite: Junior standing (60 credit hours), 2.25 LTU GPA, completion of all freshman and sophomore course requirements, departmental approval. First full-time work assignment providing computer science experience in the workplace. 1 hour credit

MCS3101 CO-OP PRACTICUM II  
Prerequisite: Satisfactory completion of MCS3001, departmental approval. Second full-time work assignment providing computer science experience in the workplace. 1 hour credit

MCS4001 CO-OP PRACTICUM III  
Prerequisite: Satisfactory completion of MCS3101, departmental approval. Third full-time work assignment providing computer science experience in the workplace. 1 hour credit

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BIO1223 BIOLOGY 2
Prerequisite: One high school science course. The biology, structure, physiology, development and reproduction of plants, animal anatomy and physiology, including nervous systems, gas exchange, excretion, the circulatory system, and reproduction. An introduction to animal behavior and the impact of pollution. Survey of ecology, biogeography, and population biology. Conservation biology. Lect. 3 hrs. 3 hours credit

BIO1231 BIOLOGY 2 LABORATORY
Prerequisite: BIO1223. Experiments to support BIO1223. Lab. 2 hrs. 1 hour credit

BIO2313 MICROBIOLOGY
Prerequisite: BIO1213. Function and structure of micro-organisms including bacteria, algae, protozoa and viruses, including how they interact with their environment including higher organisms; ecology of micro-organisms; their beneficial and harmful effects. Lect. 3 hrs. 3 hours credit

BIO2321 MICROBIOLOGY LABORATORY
Prerequisite: BIO1213. Experiments that support BIO2313 including basic and practical techniques of handling micro-organisms and of illustrating various principles of microbial life. Lab. 2 hrs. 1 hour credit

BIO2323 GENETICS
Prerequisite: BIO1223. Basic genetic materials and their function, differentiation and development; genetic proteins; gene regulation; macromolecules and chromosomes, extranuclear material – episomes and plasmids; cell division; Mendelian inheritance; gene expression including dominance and codominance, gene interaction and lethality, sex determination and linkage, inheritance; gene linkage and recombination; mechanisms including repair of mutations, changes in chromosome structure and fine structure of genes. Lect. 3 hrs. 3 hours credit

CHEMISTRY

CHM1154 INTRODUCTION TO CHEMICAL PRINCIPLES
Prerequisite: Placement. Co-requisite: MCS0054 or math placement. (An introductory course for students who have not had high school chemistry or who need preparation before taking CHM1213. No degree credit except for architecture, humanities, computer science and management majors.) Fundamentals of chemical terminology, stoichiometry calculations, atomic structure, chemical bonding, gases, solution chemistry, and the chemistry of metals and non-metals. Lect. 3 hrs., Lab/Sem. 2 hrs. 4 hours credit

CHM1213 UNIVERSITY CHEMISTRY 1
Prerequisite: 1 yr. high school chemistry and chemistry placement, or CHM1154 or CHM3144; MCS0083 or MCS1214 or co-requisite of MCS0074 or math placement. Laws and concepts of chemistry and their application to chemical systems. The liquid and solid states, phase changes and phase diagrams, topics in the chemistry of materials, oxidation-reduction chemistry, electrochemistry, chemical thermodynamics and gas-phase equilibrium. Lect. 3 hrs., Sem. 1 hr., 3 hours credit

CHM1223 UNIVERSITY CHEMISTRY 2
Prerequisites: CHM1213, CHM1221. Modern concepts of chemical bonding, symmetry, molecular-orbital theory and spectroscopic methods. The solution state and colligative properties of solutions, and solution-phase equilibrium theory applied to solubility, chemical kinetics, acids and bases, and complex formation. Descriptive chemistry of the main-group and transition elements. Lect. 3 hrs. 3 hours credit

CHM1232 UNIVERSITY CHEMISTRY 2 LABORATORY
Co-requisite: CHM1223. Laboratory experiments supporting topics covered in CHM1223, including qualitative analysis of solutions. Lab 6 hrs. 2 hours credit

CHM2313 ORGANIC CHEMISTRY 1
Prerequisites: CHM1213, CHM1221. Fundamental concepts and definitions embodying a mechanistic approach to the reactions of aliphatic and aromatic compounds. Lect. 3 hrs. 3 hours credit

CHM2323 ORGANIC CHEMISTRY 2
Prerequisite: CHM2313. Mechanisms with emphasis on functional groups, spectroscopic methods and structural proofs; selected topics with special emphasis on instrumental approaches to organic problems, organic compounds of biochemical significance. Lect. 3 hrs. 3 hours credit

CHM2332 ORGANIC CHEMISTRY LABORATORY
Prerequisite: CHM2313. Co-requisite: CHM2323. Fundamental micro and macroscopic laboratory techniques and syntheses, utilizing gas chromatographic and spectroscopic techniques together with qualitative organic analysis. Lab 6 hrs. 2 hours credit
CHM2342 ANALYTICAL CHEMISTRY
Prerequisite: CHM1223, CHM1232. Extensive use of computers including spreadsheet and word processing programs. Theory of gravimetric, volumetric, and electroanalytical methods. Theory of separation science and chromatography. Statistical analysis of analytical data. Lect. 2 hrs. 2 hours credit

CHM2352 ANALYTICAL CHEMISTRY LABORATORY
Co-requisite: CHM2342. Extensive use of computers, particularly spreadsheet programs. Practice of gravimetric, volumetric, spectrophotometric, chromatographic, and electrometric methods of quantitative chemical analysis. Lab 6 hrs. 2 hours credit

CHM2631 INSTRUMENTAL LAB
Prerequisites: CHM2342, CHM2352. Laboratory course for chemical technology majors with experiments involving chemical analysis by atomic absorption, X-ray analysis, gas and liquid chromatography, and voltammetry. Lab 3 hrs. 1 hour credit
Note: CHM2631 is intended for chemical technology majors. Bachelor's degree students in chemistry and environmental chemistry should take CHM4632.

CHM3144 FUNDAMENTALS OF CHEMISTRY
Prerequisite: Advanced standing. Introduction to chemistry covering the periodic table, atomic structure, chemical bonding, stoichiometry, solids, liquids, gases, solutions and basic organic chemistry. (For advanced students in engineering technology only.) Lect. 3 hrs, Lab. 1 hr. 4 hours credit

CHM3383 ENVIRONMENTAL CHEMISTRY
Prerequisites: CHM2323, CHM2342, CHM2352. Survey of environmental problems and how they impact upon the chemist. The chemistry of the atmosphere, natural waters, the soil and waste management. Lect. 3 hrs. 3 hours credit

CHM3403 BIOCHEMISTRY
Prerequisites: CHM2323, CHM2332. Chemistry of biologically important molecules, including carbohydrates, lipids, proteins, and nucleic acids. Bioenergetics, the genetic code, and enzyme catalysis. Lect. 3 hrs. 3 hours credit

CHM3423 PHYSICAL CHEMISTRY 1
Prerequisites: MSC2414, PHY2423, CHM2323. The First and Second Laws of Thermodynamics, with applications to phase transformations and chemical reactions. Introduction to quantum theory. Lect. 3 hrs. 3 hours credit

CHM3434 PHYSICAL CHEMISTRY 2
Prerequisites: MCS2414, PHY2423, CHM2323. Atomic and molecular structure and spectra. Statistical Thermodynamics. Kinetic theory of gases and chemical kinetics. Lect. 4 hrs. 4 hours credit

CHM3438 ENVIRONMENTAL CHEMISTRY
Prerequisites: CHM2323, CHM2342, CHM2352. Survey of environmental problems and how they impact upon the chemist. The chemistry of the atmosphere, natural waters, the soil and waste management. Lect. 3 hrs. 3 hours credit

CHM3452 INTERMEDIATE INORGANIC CHEMISTRY
Prerequisite: CHM1223. Structures, properties, and reactions of compounds of the main group and transition elements. Solid-state structures and bonding. Crystal-field theory applied to the description of the magnetic and spectroscopic properties of metal complexes. Lect. 2 hrs. 2 hours credit

CHM3463 ADVANCED SYNTHESIS LABORATORY
Prerequisites: CHM2323, CHM2332, CHM2342. Preparation and characterization of inorganic, organic, and organometallic compounds using advanced laboratory techniques. Lect. 1 hr. Lab 6 hrs. 3 hours credit

CHM3503 COMPUTER APPLICATIONS IN CHEMISTRY
Prerequisite: MCS1102. Application of computers and computer programming to the solution of chemical problems and to instrument control in the laboratory. Lect. 1 hr. Lab 6 hrs. 3 hours credit

CHM3601 SEMINAR IN CHEMICAL TOPICS
Prerequisite: Junior standing in chemistry and permission of department chairman. The presentation of a paper on an approved topic, or a seminar on a specialized topic. 1 hr. credit

CHM3623 INTRODUCTION TO POLYMER CHEMISTRY
Prerequisites: CHM2323, CHM2332. Co-requisite: CHM3434. Introduction to the principles of high molecular weight materials, the kinetics of their synthesis, characterization, manufacture, and structure-property relationships. Lect. 3 hrs. 3 hours credit

CHM4522 ADVANCED SPECTROSCOPY
Prerequisites: CHM3434, CHM3442. Topics in advanced UV-VIS and IR spectroscopy, NMR, ESR, and mass spectroscopy. Symmetry with applications to spectroscopy. Lect. 2 hrs. 2 hours credit

CHM4642 PHYSICAL-ANALYTICAL LABORATORY 2
Co-requisite: CHM4522. Laboratory experiments supporting topics covered in CHM4522. Lab 6 hrs. 2 hours credit

CHM4631 INSTRUMENTAL ANALYSIS
Prerequisites: CHM2631, CHM3434. Primarily the lecture portion of CHM4632; intended for those who took CHM2631 as Chemical Technology majors. CHM2631 together with this course is equivalent to CHM4632. Lect. 1 hr. 1 hour credit

CHM4632 INSTRUMENTAL ANALYSIS LABORATORY
Prerequisite: CHM3434. Laboratory problems involving chemical analysis by atomic absorption, X-ray analysis, gas and liquid chromatography, and voltammetry. Lect. 1 hr. Lab 3 hrs. 2 hours credit

CHM4643 ADVANCED INORGANIC CHEMISTRY
Prerequisites: CHM3452, CHM3442. Advanced topics in theoretical and descriptive inorganic and organometallic chemistry. Kinetics and mechanisms of inorganic reactions. Symmetry and molecular orbital theory applied to the structural and spectroscopic properties of inorganic compounds. Lect. 3 hrs. 3 hours credit
CHM4723 ADVANCED ORGANIC CHEMISTRY  
Prerequisites: CHM2323, CHM2332. Kinetics and mechanism in organic chemistry. Lect. 3 hrs. 3 hours credit

CHM4843 SOLID STATE CHEMISTRY  
Prerequisite: CHM3434. Brief review of atomic theory, crystal structure, binding forces, mechanical and thermal properties, electrical and magnetic properties of dielectrics, metals, semiconductor and magnetic materials. Lect. 3 hrs. 3 hours credit

CHM4941-3 INDEPENDENT STUDY IN CHEMISTRY  
Prerequisite: Permission of department chair. Research or special studies under the direction of a staff member. 1, 2 or 3 hours credit, 4 hours maximum.

CHM4951-3 INTERNSHIP IN CHEMISTRY  
Prerequisite: Permission of the department chair. Internship work experience in chemistry at a laboratory or industrial placement. A minimum of 5 hours/week (on average) for each credit hour for the 15 week semester. A final report including a log documenting the work done, plus a written assessment from the employer is required for class credit. 1, 2 or 3 hours credit.

GEOLOGY  
GLG1103 GEOLOGY  
Prerequisite: 0. Minerals; igneous, sedimentary and metamorphic rock formations and processes. Glaciation, ground water, water resources, mass wasting and volcanology. Case studies of practical geology problems. Lect. 3 hrs. 3 hours credit

PHYSICAL SCIENCE  
PSC1113 PHYSICAL SCIENCE 1  
Prerequisite: 0. Atomic structure emphasizing Bohr’s Theory and current views on elementary particles. Nuclear reactions. Fundamental concepts in chemistry. Organic chemistry and its applications. Environmental and ecological concerns. Topics of geology, the atmosphere and weather. Lect. 3 hrs. 3 hours credit

Note: Humanities and management majors can receive credit for only one of the following courses: CHM1154 and PSC1113. No credit for CHM1154 or PSC1113 after taking CHM1213 (University Chemistry).

PSC1123 PHYSICAL SCIENCE 2  
Co-requisite: MCS1214. An algebra-based introduction to the basic principles of science, particle motion, wave motion, heat and astronomy. Lect. 3 hrs. 3 hours credit

Note: Humanities and management majors can receive credit for only one of the following courses: PHY1154 and PSC1123. No credit for PHY1154 or PSC1123 after College Physics or University Physics.

PSC1131 PHYSICAL SCIENCE LAB  
Prerequisite: One college science course. Experiments in Physics, Chemistry, Astronomy and earth sciences. Lab 2 hrs. 1 hour credit

PSC1161 PHYSICAL SCIENCE SEMINAR  
Prerequisites: Physics or Chemistry major or approval of the department chair. Portfolio development, group collaborative projects, discussions, written and oral presentations of current topics in physical science, particularly chemistry and physics. Lect. 1 hr. 1 hour credit

PHYSICS  
PHY0023 BASIC PHYSICS  
Prerequisite: 0. Density, force, pressure, work formula, simple machines, energy, power, metric units, friction, vectors, Newton’s Laws, and d-c circuits. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

PHY1063 TECHNICAL PHYSICS  
Prerequisites: One year of high school lab science or PHY0023. Co-requisite: MCS1113. Systems of measurement, velocities, acceleration, laws of motion, composition and resolution of forces, work, power, energy and machines, mechanics of solids and liquids. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit
PHY1083 TECHNICAL PHYSICS II
Prerequisite: PHY1063. Co-requisite: MCS1123. Temperature, heat transfer, change of state, magnetic and electric fields, electrical units and current electricity with its magnetic and heating effects, alternating current, light reflection, refraction and physical optics. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

PHY1100 TECHNICAL PHYSICS LAB 1
Co-requisite: PHY1063. Introductory lab covering experiments in mechanics, heat, electricity and magnetism and light. Lab. 1 hr. 0 hours credit
Note: PHY1100 is the first part of a lab that runs for two semesters. A grade will be only issued after taking PHY1101 (see below).

PHY1101 TECHNICAL PHYSICS LAB 2
Prerequisite: PHY1100. Co-requisite: PHY1063. Second semester of the lab which runs for two semesters. The grade for the lab is given at the end of this course. Lab. 1 hr. 1 hour credit

PHY1154 INTRODUCTION TO PHYSICAL PRINCIPLES
Prerequisite: MCS0093 or MCS0074; experience with computers. For students who have not had high school physics or need additional preparation before PHY2213 or PHY2414. An introduction to mechanics, heat, sound, light, electricity and magnetism. May not be used to satisfy graduation requirements for degrees in architecture, chemistry, engineering, mathematics and physics. Satisfies general education science lab requirement. Integrated Lab. & Lect. 4 hrs. 4 hours credit

PHY1173 RADIATION AND ENVIRONMENTAL PHYSICS
Prerequisite: High school chemistry or CHM1154; high school physics; and MCS0054 or equivalent. Study of environmental effects of hazardous materials. The techniques of radioisotope quantification, radioactive decay processes, disposal and its biological hazards. Environmental impact of thermal pollution, chemicals, ionizing radiation and physical hazards. Specific regulations that govern radioactive materials are covered. Lect. 3 hrs. 3 hours credit

PHY1181 RADIATION AND ENVIRONMENTAL PHYSICS LAB.
Co-requisite: PHY1173. Primarily experimental techniques in detecting and quantifying radiation and the identification of radioisotopes present in samples of materials. Lab. 2 hrs. biweekly. 1 hour credit

PHY2213 COLLEGE PHYSICS 1
Prerequisite: MCS0074 or MCS0093, or placement; MCS1203; PHY1153 or PHY1154 or placement. Kinematics and dynamics of particles, work, energy, bodies in equilibrium, wave motion, elasticity, heat transfer, thermal energy and thermodynamics. Lect. 3 hrs. 3 hours credit

PHY2221 COLLEGE PHYSICS 1 LABORATORY
Prerequisite: MCS1003 or EGE1102 or equivalent computer experience. Co-requisite: PHY2223. Introductory laboratory covering experiments to complement College Physics 1. Lab. 2 hrs. 1 hour credit

PHY2223 COLLEGE PHYSICS 2
Prerequisite: PHY2213, MCS1224. Geometric optics, electric charge, current, DC circuits, magnetism, induction, special relativity, particle waves, radioactivity and biological effects of radiation. Lect. 3 hrs. 3 hours credit

PHY2231 COLLEGE PHYSICS 2 LABORATORY
Prerequisites: PHY2213, PHY2221. Co-requisite: PHY2223. Introductory lab covering experiments compatible with College Physics 2. Lab. 2 hrs. 1 hour credit

PHY2413 UNIVERSITY PHYSICS 1
Prerequisites: MCS1424; PHY1153 or PHY1154 or placement. Co-requisites: PHY2421, MCS2414. Kinematics and dynamics of particles, conservation of energy, relativistic mechanics, statics and dynamics of rigid bodies. Mechanics of fluids, temperature, heat and thermal energy; laws of thermodynamics; wave motion and sound. Lect. 3 hrs., Studio 1 hr. 3 hours credit

PHY2421 UNIVERSITY PHYSICS 1 LAB
Prerequisites: MCS1003 or EGE1102 or equivalent computer experience. Co-requisite: PHY2413. Introductory laboratory experiments to complement University Physics 1. Lab. 2 hrs. 1 hour credit

PHY2423 UNIVERSITY PHYSICS 2
Prerequisites: MCS2423 and PHY2413. Co-requisite: PHY2431. Introductory study of electrostatics, direct currents, magnetism, electromagnetic waves. Light reflection, refraction, and polarization. Imaging by a mirror and lens. Lect. 3 hrs., Studio 1 hr. 3 hours credit

PHY2431 UNIVERSITY PHYSICS 2 LAB
Prerequisite: PHY2421. Co-requisite: PHY2423. Introductory laboratory experiments complementing University Physics 2. Lab. 2 hrs. 1 hour credit

PHY3513 THEORETICAL MECHANICS 1
Prerequisites: MCS2423, MCS1102, PHY2414, PHY2423. The statistics and dynamics of particles and rigid bodies making use of Newtons and Lagranges equations. Lect. 3 hrs. 3 hours credit

PHY3523 THEORETICAL MECHANICS 2
Prerequisite: PHY3513. A continuation of Theoretical Mechanics I. Lect. 3 hrs. 3 hours credit

PHY3574 ELECTRICITY AND MAGNETISM
Prerequisites: MCS2423, PHY2423. Co-requisite: MCS3723. Vector analysis; Coulombs law and electric field intensity, electric flux density, Gauss law and divergence; energy and potential; conductors, dielectrics, and capacitance; experimental mapping methods; Poissons and Laplaces equations. Steady magnetic field, magnetic forces, materials, and inductance; time varying fields and Maxwells equations; the uniform plane wave; the laws of circuit theory; transmission lines. Lect. 4 hrs. 4 hours credit

PHY3611 BASIC CIRCUITS AND ELECTRONIC LAB
Co-requisite: PHY3613. A sequence of experiments that examine linear circuit analysis, BJT and FET analog and digital transistors circuits. Rectification and filtering. Lab 2 hrs. 1 hour credit

PHY3613 BASIC CIRCUITS AND ELECTRONICS
Prerequisites: MCS2423, PHY2423. Sinusoidal steady state response of circuits and transient behavior. Semiconductor devices, electronic circuits and amplifiers. Digital, logic and counting circuits. Lect. 3 hrs. 3 hours credit
PHY3653 CONTEMPORARY PHYSICS
Prerequisites: MCS2414, PHY2423. Introduction to the concepts of 20th century physics: interference and diffraction, relativity, photoelectric effect, the Heisenberg uncertainty principle, Bohrs model of the atom, Schroedingers wave equation, radioactivity, nuclear reactions, statistical mechanics, condensed matter physics, astrophysics and cosmology. Lect. 3 hrs. 3 hours credit

PHY3661 CONTEMPORARY PHYSICS LABORATORY
Prerequisite: PHY2421. Co-requisite: PHY3653. Physics major or permission of department chairman. Laboratory experiments to complement the material presented in PHY3653 Lab. 3 hrs. 1 hour credit

PHY4703 SCIENCE SEMINAR FOR EDUCATORS
Prerequisite: Teacher certification and permission of department chairman. Properties and structures of matter, motion, work and heat, energy, sound, light, electric circuits, electromagnetism, and nuclear science. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

PHY4724 QUANTUM MECHANICS
Prerequisites: PHY3653, MCS2423, MCS1102. A theoretical study of the non-relativistic quantum interpretation of matter. Development of wave mechanics, the Schroedinger equation. Formal structure of quantum mechanics. Operators. Solution of one-dimensional and three-dimensional systems. Lect. 4 hrs. 4 hours credit

PHY4743 OPTICS, LASERS AND MICROSCOPY
Prerequisites: MCS2414, MCS1102, PHY2423. Co-requisite: PHY4781. Geometric and physical optics, wave theory, including microwaves, leading to a discussion of fiber optics, microscopy, coherence theory and the laser. (Serves as a basis for students planning graduate study in optical engineering.) Lect. 3 hrs. 3 hours credit

PHY4763 THERMAL PHYSICS
Prerequisite: PHY3653. Logical discussion of entropy, temperature, the Boltzman factor, the chemical potential, the Gibbs factor, distribution functions, semiconductor statistics, heat and work. Lect. 3 hrs. 3 hours credit

PHY4781 OPTICS, LASERS AND MICROSCOPY LABORATORY
Prerequisite: PHY2421, PHY2431. Co-requisite: PHY4743. Experiments in optics including lasers, microscopes, telescopes, fiber optics, microwaves and holograms supporting PHY4743 including optical methods used in contemporary science. Lab. 3 hrs. 1 hour credit

PHY4823 NUCLEAR PHYSICS
Prerequisite: PHY3653 and PHY3661. Discussion of nuclear structure, radiation, radiation detection, theoretical nuclear models and elementary particles. Lect. 3 hrs. 3 hours credit

PHY4843 CONDENSED MATTER PHYSICS
Prerequisite: PHY3653. Brief review of atomic theory, crystal structure, binding forces, mechanical and thermal properties, electrical and magnetic properties of dielectrics, metals, semiconductors and magnetic materials. Lect. 3 hrs. 3 hours credit

PHY4912 PHYSICS PROJECT 1
Prerequisite: Senior standing. Practice in experimental or theoretical research techniques through setting up and carrying out projects in classical and modern physics. Lab. 2 hrs. 2 hours credit

PHY4922 PHYSICS PROJECT 2
Prerequisite: PHY4912. Continuation of Physics Project 1. Lab. 2 hrs. 2 hours credit

PHY4981-3 INTERNSHIP IN PHYSICS
Prerequisite: Permission of the department chair. Internship work experience in physics at a laboratory or industrial placement. A minimum of 5 hours/week (on average) for each credit hour for the 15 week semester. A final report including a log documenting the work done, plus a written assessment from the employer is required for class credit. 1, 2, or 3 hours credit

PHY4991-3 DIRECTED STUDY IN PHYSICS
Prerequisite: Senior standing. Laboratory experiments to complement the material presented in PHY4981. Lab. 2 hrs. 2 hours credit

SCO1000 CO-OP PARALLEL PRACTICUM 1
Prerequisites: 2.25 LTU GPA, departmental approval. First half-time work assignment providing science experience in the workplace. Credit given upon completion of SCO1001.

SCO1001 CO-OP PARALLEL PRACTICUM 2
Prerequisites: Satisfactory completion of SCO1000 and/or departmental approval. Second half-time work assignment providing science experience in the workplace. 1 hour credit.

SCO2000 CO-OP PARALLEL PRACTICUM 3
Prerequisites: Satisfactory completion of SCO1001 and/or departmental approval. Third half-time work assignment providing science experience in the workplace. Credit given upon completion of SCO2001.

SCO2001 CO-OP PARALLEL PRACTICUM 4
Prerequisites: Satisfactory completion of SCO2000 and/or departmental approval. Fourth half-time work assignment providing science experience in the workplace. 1 hour credit.

SCO3000 CO-OP PARALLEL PRACTICUM 5
Prerequisites: Satisfactory completion of SCO2001 and/or departmental approval. Fifth half-time work assignment providing science experience in the workplace. Credit given upon completion of SCO3001.

SCO3001 CO-OP PARALLEL PRACTICUM 6
Prerequisites: Satisfactory completion of SCO3000 and/or departmental approval. Sixth half-time work assignment providing science experience in the workplace. 1 hour credit.
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Associate Dean: Richard S. Maslowski, E98, Ext. 2500
Assistant Dean: Alan L. Prasuhn, E23, Ext. 2545

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Thomas Vanslembrouck engineer, General Motors Corp.


About the College of Engineering

Engineering is a profession in which principles of science, mathematics, and economics are applied, using the engineering method to cause changes which benefit society. Engineers endeavor to understand problems, design plans to solve problems, carry out these plans and follow up to check the results obtained. Engineers must be both analytical and creative and must exercise leadership to accomplish goals. Because their actions can influence many lives, engineers must have a strong sense of ethics, and an understanding of the society and environment in which they live.

Lawrence Technological University’s College of Engineering places high priority on the preparation of students to enter the profession in industry, government or private practice or to pursue advanced degrees. The curriculum provides a strong background in the fundamentals of engineering as well as more specialized topics while emphasizing the core of knowledge and experience common to all the engineering disciplines. Program areas have been selected to provide students with the greatest flexibility and mobility in their career choices and to avoid over-specialization.

Lawrence Tech’s engineering, engineering technology and management programs include both theoretical and practical dimensions consistent with the University’s motto, “theory and practice.” The faculty consists of engineers and managers distinguished with both strong academic and professional credentials as well as significant industrial experience. Many engineering faculty are concurrently working with industry, which insures that the program reflects a strong real world orientation.

Lawrence Tech’s undergraduate programs in civil, electrical and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET), Inc.

Civil Engineering

Working with people and the environment, civil engineers plan, design, construct, operate and maintain structures and facilities such as bridges, dams, commercial and industrial buildings; transportation facilities including airports, highways, pipelines, ports, and railroads; water supply and wastewater treatment works; waterways and flood protection; and other public and private projects.

Typical employers include construction and consulting engineering firms, local, state and federal government agencies, and industrial organizations involved in related activities.

Careers may include analysis and design, computer modeling, operation and maintenance of systems and facilities, supervision and coordination of major construction projects, or technical specialization in such areas as environmental management, materials, project planning, or soils and foundations.

The C.E. departmental objectives are to:
• Offer a program directed toward a broad, high quality, baccalaureate educational experience in the civil engineering discipline, intended to parallel the university guiding principle of “theory and practice.”
• Offer a program designed to provide the students with (a) a strong basic understanding of the fundamental principles of engineering; (b) the ability to apply the principles of science, mathematics, and engineering to the formulation and solving of engineering problems; and (c) understand the impact of those solutions in a global and societal context.
• Offer a program that emphasizes the traditional analytical skills while employing the latest technological tools including the integration of computer applications through the civil engineering courses.
• Offer a program that emphasizes design concepts and applications, with design integrated throughout the curriculum, culminating in a multi-disciplinary senior-level design project sequence.
• Offer a program that ensures the development of communication skills by emphasizing report writing and in-class presentations throughout the curriculum.
• Offer a program that ensures that graduates are competent in the many facets of laboratory investigation including design of experiments, experimental techniques, the analysis of data, and interpretation of results.
• Offer a program that stresses all aspects of professionalism including ethics, participation in professional organizations, professional development through life-long learning, service, sustainable development passing the Fundamentals of Engineering exam, and ultimately becoming a registered professional engineer.
• Offer a graduate program at the master’s level that expands upon the undergraduate education.

The civil engineering program at Lawrence Tech includes 15 elective credits in the senior year. This permits the student to concentrate in construction, environmental and water resources, or structural engineering, and to a lesser degree, geotechnical or transportation engineering; or some combination of the above.

Engineering design, the process that sets engineers apart from colleagues in other professional areas, is integrated throughout the curriculum. First year students are introduced to the design process in Civil Engineering Materials and Civil Engineering Perspective. This is carried out through the junior and senior years during which time design components in all civil engineering disciplines are emphasized. The senior year culminates in a two-semester design project in which design skills, analysis techniques, and real-world constraints all come together in a team project that rounds out the undergraduate education.

Lawrence Tech also offers a graduate program in civil engineering with a focus on the infrastructure, emphasizing construction, environmental, structural, and geotechnical engineering, which leads to a Master of Civil Engineering. For further information on the Master of Civil Engineering, see the Graduate Catalog.
ELECTRICAL AND COMPUTER ENGINEERING

Two degrees are offered in the ECE Department, a Bachelor of Science in electrical engineering, and a Bachelor of Science in computer engineering. The decision as to which degree to pursue should be based on a careful consideration of the student’s goals and objectives, compared to the objectives of each of the two programs. Faculty are eager to discuss this and other issues with students. All students should have an advisor-approved plan of work, and see their academic advisor at least once per year. A list of advisors can be obtained from the ECE Office, E217.

The Electrical and Computer Engineering program integrates the design experience throughout its curriculum. This process starts with the freshman level courses, Introduction to Engineering and Engineering Computer Applications Lab. The design experience continues through the junior and senior years using open-ended design exercises to emphasize basic design principles. This process culminates in a two-semester senior design project in which design skills, analysis techniques, and oral and written communication skills all come together in a unified design experience.

The objectives of the E.C.E. Department are to educate students who shall:
• Upon graduation, either become rapidly employed as electrical engineers, or find success in graduate study.
• Possess the proper background to make them productive, reliable, and competitive in their subsequent professional and/or education endeavors.
• Demonstrate and promote the highest standards of ethics and professionalism throughout their careers.

Bachelor of Science in Electrical Engineering – Electrical engineers apply electrical, electronic, and magnetic theory to obtain solutions for problems related to the development, design, and operation of electrical hardware and software, control systems, electrical machines and communications systems. Besides development, design, operations, and research, electrical engineers may be involved in manufacture, installation, and sale of electrical and electronic equipment and are employed by a wide variety of organizations which produce, use, or service this equipment.

Three areas of concentration are available in electrical engineering at Lawrence Tech. Computer engineering is intended for those students who wish to emphasize computer and digital system design. Electronics engineering is intended for students who want to obtain a specific background in electronic circuit design. Electrical and Power Systems is intended for students who wish to concentrate in the control of power and electromechanical systems. Each concentration requires an identical core curriculum, three specific concentration courses, two approved technical design electives, and three lab courses associated with concentration and/or technical elective courses.

Bachelor of Science in Computer Engineering – The world is in the midst of a technological revolution that is being fueled by continuous improvements in the speed and capabilities of computers. Computer engineers are concerned with the design, development, and implementation of new and challenging computer technology in a myriad of consumer, industrial, commercial, and military applications. For example, every major automotive subsystem (engine, traction, brakes, suspension, climate control, instrument cluster, etc.), on a modern automobile is computer controlled. Working in these areas requires expertise in all aspects of computer hardware and software, and requires the engineer to be able to make hardware/software tradeoffs in developing an optimum system design.

The program at Lawrence Tech is specifically designed with these goals in mind - to give graduating computer engineers the skills necessary to be proficient in both hardware design and computer programming, and to be able to integrate these two areas into a single computer-oriented design.

Students receive a strong background in the principles of electrical engineering from the ECE Department, and computer science from the Math/Computer Science Department. Several courses specifically deal with the challenge of incorporating both hardware and programming designs into a single integrated product design. The program includes a core of electrical engineering and computer science courses, plus one math/science elective, two electrical engineering electives, and two computer science electives. A list of acceptable elective courses can be obtained from the ECE Department office in E217.

MECHANICAL ENGINEERING

The mission of the Department of Mechanical Engineering is to prepare individuals for careers in mechanical engineering, to provide industry and the profession with well-educated graduates, to help maintain and upgrade the capabilities of practicing engineers, and to generate solutions to industrial problems through applied research.

The department’s vision is to be the institution of choice for mechanical engineering education because of an accessible and effective program focused on industry needs and the development of strong professional relationships between students, faculty, and alumni.

The objectives of the department are to:
• enhance the quality of the undergraduate education;
• develop the faculty in mechanical engineering;
• enhance service to the students;
• continue to develop the Master of Engineering degrees in Manufacturing Systems and Automotive Engineering;
• expand capital equipment for the ME department to better support the educational program; and to
• enhance the reputation and visibility of the ME department in the outside industrial community.
Mechanical engineers apply their knowledge of the physical world to solve problems related to the development of consumer products. Their interests cover such diverse topics as automotive engineering, acoustics, machine design, heating and air conditioning, manufacturing engineering, fluids and hydraulics, stress analysis, computer-aided design/engineering, among many others.

Mechanical engineering is a very versatile degree; graduates may work in such areas as design, analysis, testing, manufacturing, technical sales, and engineering management. Mechanical engineers are employed by a full spectrum of organizations including manufacturers, aerospace, biomedical, government, consulting firms, and research and development organizations.

All mechanical engineering students study the same core curriculum, which includes courses in three broad technical areas: manufacturing, mechanical systems, and thermal science. Manufacturing courses cover how products are made. Mechanical systems courses cover the study of mechanisms and structures. Thermal science courses cover heat transfer, fluid mechanics and energy conversion. Since many new consumer products are electro-mechanical in nature, the core curriculum also includes a sequence in electrical engineering.

As seniors, mechanical engineering students are required to take four technical electives. Students may concentrate in a particular subfield by selecting at least three of the four electives from a special list for that concentration. Four concentrations are offered: automotive engineering, manufacturing, mechanical system design, and thermal system design. The diploma only lists the mechanical engineering major. Students who do not choose a concentration, or find it inconvenient to do so, can complete their degree requirements by taking any combination of four technical electives. A list of acceptable electives is available from the Mechanical Engineering Office or from a faculty advisor.

The mechanical engineering program integrates the design experience throughout its curriculum. Student design experience starts with the freshman level Introduction to Engineering and Engineering Computer Applications Lab, and it continues to the capstone senior projects courses, Projects 1 and Projects 2. In lower level courses, primarily open-ended design exercises are utilized to teach various aspects of design. Senior projects provide an extensive, structured design experience with a strong emphasis on teamwork, and oral and written communications.

Lawrence Tech offers two graduate programs in mechanical engineering: Master of Automotive Engineering and Master of Engineering in manufacturing systems. These programs are described in the Graduate Catalog.

FE REQUIREMENT

Candidates for degrees in civil, electrical, or mechanical engineering are strongly encouraged to complete the Fundamentals of Engineering Examinations administered by the National Council of Engineering Examiners.

ENGINEERING TECHNOLOGY

Associate degrees — The Department of Engineering Technology in the College of Engineering offers the opportunity to prepare for rewarding and responsible careers in support and management of technical and engineering activities in business and industry.

Students may earn an associate degree with a major in construction, electrical, mechanical, or manufacturing engineering technology. These programs enable graduates to participate as part of the engineering/technical team as technologists and technicians.

Working under the supervision of engineers, scientists or technologists, technicians are employed in a wide variety of industry, business and government organizations involved in manufacturing, development, design and testing, computer applications, electronics, construction, regulation, quality control, maintenance, and sales, to name a few examples.

While the associate degree is sufficient for many students who seek full-time employment as technicians, or for those who plan to seek an additional degree, several alternatives are available at Lawrence Tech. Students may combine technical courses with business and management courses to earn both an associate degree and a Bachelor of Science degree in technology management. Other students may choose to first earn an associate degree, and then to begin earning a Bachelor of Science degree in engineering technology, technology management, industrial management, or some other major. Students interested in any alternative should consult the department chairs of each program involved to determine an appropriate course plan.

Bachelors degrees — Students who hold an associate degree in a technical discipline may enroll in a program leading to the Bachelor of Science degree in engineering technology. This program adds a broader technical base to the highly specialized associate degree programs allowing graduates to exercise a higher level of technical responsibility while also providing the general education and administrative skills required for most technical supervisory roles.

Graduates of this program are technologists in the engineering/technical team and are employed by industrial and business organizations in both technical and supervisory/management and sales roles. This program is especially useful to upwardly mobile technicians who are preparing for new career opportunities based on their technical skills.

The industrial management degree (B.S.I.M.) includes specific course work which has special applicability to operations management situations in both manufacturing and service organizations. It has been an especially attractive degree to major manufacturing operations such as the automotive industry and its suppliers.

The technology management (B.S.T.M.) degree is a unique degree which combines the foundations of both tech-
The Associate of Science in manufacturing engineering/technology degree is awarded by Lawrence Tech. The program is unique in its design and all academic work is done at the Center for Advanced Technologies at Focus: HOPE. The Center contains a state of the art manufacturing facility and is the location for the academic programs.

The degree candidates are accepted into the program after completion of 52 weeks at the Machinist Training Institute where they receive training in precision machining and metalworking along with other academic skills. At the Center, the candidate works 40 hours per week at various manufacturing job rotations while taking electronically delivered college-level courses with the assistance of faculty coaches and on-site tutors. The integrated engineering experience provides an education for advanced manufacturing engineer-technologists at world competitive levels.

Further information on admission to this special program is available through the Greenfield Coalition Program Director, E179, ext. 2069.

COOPERATIVE EDUCATION

Engineering and Engineering Technology:
A co-op program is offered for qualified students in civil, electrical, computer, and mechanical engineering and engineering technology who have reached the junior year. To be accepted as a co-op student, applicants must have completed all the mathematics, science, English and communications requirements of the common core by the first work period; and must successfully complete a personal interview with the program director. A minimum cumulative GPA of 2.25 is required. Transfer students must have completed at least one semester at Lawrence Tech prior to the first work assignment.

Co-op placement depends on the availability of appropriate jobs in industry. The employer makes the final selection of candidates. Consequently, Lawrence Tech cannot guarantee that applicants, otherwise qualified, will be placed in a co-op position.

Co-op students work in industry full-time days and attend Lawrence Tech full-time during alternate semesters. While working, they are registered for a co-op practicum (1 credit hour).

The work assignment provided by the employer is approved by the co-op director in association with an engineering faculty member. Co-op companies are expected to provide workplace experience related to the student’s major.

The co-op program normally adds two semesters to the schedule. Students are paid by the co-op employer while they are working. Interested students can obtain complete information, including limitations and requirements, by contacting the Cooperative Education Office.
# Bachelor of Science in Civil Engineering

**Total Semester Credit Hours: 131**

## Freshman Year

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<tr>
<th>Course No.</th>
<th>Subject</th>
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<th>Course No.</th>
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<td>LLT1213</td>
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<td>CE Comp App Lab</td>
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<td>MCS1424</td>
<td>Calculus 2</td>
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**Total: 17 Cr.**

## Sophomore Year

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<td>Diff Equations</td>
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**Total: 17 Cr.**

## Senior Year

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<td>ECE4051</td>
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**Total: 16 Cr.**

---

**Engineering Science Elective (3 credits):** One course to be selected from the following: EGE3003 Thermodynamics, EGE3043 Dynamics, or EME4613 Introduction to Thermal Systems (non-ME).

**Technical Electives (15 credits):** Five technical electives to be chosen from the following list of courses so that the design credits equal or exceed seven.

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<td>ECE4263 Cost Estimating, Bidding &amp; Contracting</td>
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See your academic advisor for elective requirements and further specific information on your degree program.

Dual majors will be permitted a number of substitutions as approved by the department chairman consistent with accreditation requirements.

**Civil Engineering Advisor:**
Alan Prasuhn, ext. 2545, VAX Username: PRASUHN, room E23
### Bachelor of Science in Computer Engineering

**Total Semester Credit Hours: 131**

#### Freshman Year

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**Sophomore Year**

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**Junior Year**

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**Senior Year**

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* See the Electrical and Computer Engineering Department for a list of approved Math/Science electives.

A list of Technical Elective courses is available from the Electrical and Computer Engineering Department, E217.

Dual Majors will be permitted a number of substitutions as approved by the department chairman consistent with accreditation requirements.

**Electrical and Computer Engineering Advisor:**

Each student should have an advisor-approved Plan of Work. Contact the Electrical and Computer Engineering Office, Room E217 for your faculty advisor.

### Bachelor of Science in Electrical Engineering

**Total Semester Credit Hours: 131**

#### Freshman Year

<table>
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<tr>
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**Sophomore Year**

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**Junior Year**

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**Senior Year**

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Labs are required with a number of concentration and Technical Elective courses; these can be used to satisfy the general EE lab requirements. A list of Technical Elective courses is available from the Electrical and Computer Engineering Department, E217.

Requirements for the three concentration courses are:

**Computer Engineering**

<table>
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**Electrical and Computer Engineering Advisor:**

Each student should have an advisor-approved Plan of Work. Contact the Electrical and Computer Engineering Office, Room E217 for your faculty advisor.
# BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

**Total Semester credit hours: 131**

## FRESHMAN YEAR

<table>
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**TOTAL SEMESTER CREDIT HOURS**: 16

## SOPHOMORE YEAR

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**TOTAL SEMESTER CREDIT HOURS**: 16

## JUNIOR YEAR

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**TOTAL SEMESTER CREDIT HOURS**: 18

## SENIOR YEAR

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<td>2</td>
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<tr>
<td>EME4402</td>
<td>Mechanics Lab</td>
<td>2</td>
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<tr>
<td>EME4012</td>
<td>Comp Aided Engr</td>
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<td>EME4XXX*</td>
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<tr>
<td>EME4XXX*</td>
<td>Tech Elective</td>
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</tbody>
</table>

**TOTAL SEMESTER CREDIT HOURS**: 13

See your academic advisor for elective requirements and further specific information on your degree program.

* Undergraduate BSME students maintaining a minimum 3.0 GPA may also select electives from EME5XX3 courses.

Dual majors will be permitted a number of substitutions as approved by the department chairman consistent with accreditation requirements.

**MECHANICAL ENGINEERING ADVISOR:**
Contact the Mechanical Engineering Records Office, Room E31, ext 2592, for your faculty advisor (they are assigned by student number). If you cannot reach your advisor, contact the Mechanical Engineering Office, ext. 2550, room E29.

---

# BACHELOR OF SCIENCE IN INDUSTRIAL MANAGEMENT

**Recommended course scheduling for part-time students**

**Total Semester credit hours: 121**

## FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM1001</td>
<td>University Seminar</td>
<td>1</td>
</tr>
<tr>
<td>MCS1214</td>
<td>Math Anal 1</td>
<td>4</td>
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<tr>
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<td>Phys Science 1</td>
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<td>COM1103</td>
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**TOTAL SEMESTER CREDIT HOURS**: 11

## THIRD SEMESTER

<table>
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<tr>
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**TOTAL SEMESTER CREDIT HOURS**: 9

## FIFTH SEMESTER

<table>
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**TOTAL SEMESTER CREDIT HOURS**: 9

## SEVENTH SEMESTER

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<td>FIN3103</td>
<td>Intro Finance Mgt</td>
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**TOTAL SEMESTER CREDIT HOURS**: 9

## NINTH SEMESTER

<table>
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<td>Op Mgt Elect</td>
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</tr>
<tr>
<td>XXX3</td>
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**TOTAL SEMESTER CREDIT HOURS**: 9

## TENTH SEMESTER

<table>
<thead>
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<tr>
<td>XXX3</td>
<td>Indus Elect</td>
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<tr>
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**TOTAL SEMESTER CREDIT HOURS**: 9

## ELEVENTH SEMESTER

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**TOTAL SEMESTER CREDIT HOURS**: 9

## THIRTEENTH SEMESTER

<table>
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<tr>
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</table>

**TOTAL SEMESTER CREDIT HOURS**: 9

**Note:** Progress may be accelerated by completing additional courses in any semester including summer.

**B.S.I.M. UPPER DIVISION REQUIREMENTS**

<table>
<thead>
<tr>
<th>Operations Management Electives</th>
<th>Industrial Electives</th>
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<tbody>
<tr>
<td>HRM3023 Personnel/HR Mgt</td>
<td>EGE1012 Intro to Engineering</td>
</tr>
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<td>HRM4013 Empl/Mgt Relations</td>
<td>MKT3073 Technical Sales</td>
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<tr>
<td>HRM4033 HR Prob &amp; Policies</td>
<td>TIE2013 Prod &amp; Work Meas</td>
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<tr>
<td>MKT3043 Logistics Mgt</td>
<td>TIE2033 Ergonomics &amp; Saf</td>
</tr>
<tr>
<td>TOM4123 Adv Oper Mgt</td>
<td>TIE2063 Manufac Proc</td>
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<tr>
<td>TOM4093 Ind Study in Op Mgt</td>
<td>TIE2093 Metrology &amp; QC</td>
</tr>
<tr>
<td>TIE2123 Project Mgt</td>
<td>TIE2153 Manufac Proc 2</td>
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<tr>
<td>EME1023 Tech Graphics</td>
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</table>

Choose 8 courses from the combined lists of Operations Management Electives and Industrial Electives. At least 3 of the 8 courses should be Operations Management Electives. Total semester credit hours for the Industrial Management degree are a minimum of 121.

---

102  
Undergraduate Catalog 2001-2003
# Bachelor of Science in Technology Management

Recommended course scheduling for part-time students in computer, construction, electrical and manufacturing technology majors.

**Total Semester Credit Hours: 121**

### First Semester

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tbody>
<tr>
<td>COM1001</td>
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<tr>
<td>CHM1154</td>
<td>Intro Chem Prin</td>
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</tr>
<tr>
<td>MCS1023</td>
<td>Tech Comp Appl</td>
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### Second Semester

<table>
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<th>Subject</th>
<th>Cr.</th>
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<tbody>
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<tr>
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<td>Tech Math 1</td>
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<td>PHY1063</td>
<td>Tech Physics 1</td>
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<tr>
<td>PHY1100</td>
<td>Tech Physics Lab</td>
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### Third Semester

<table>
<thead>
<tr>
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<th>Subject</th>
<th>Cr.</th>
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<tbody>
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<tr>
<td>MCS1123</td>
<td>Tech Math 2</td>
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<tr>
<td>PHY1083</td>
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<td>MGT2113</td>
<td>Intro Business Law</td>
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### Fifth Semester

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<tr>
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<th>Subject</th>
<th>Cr.</th>
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<td>MCS2113</td>
<td>Statistics 1</td>
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<td>SSC2313</td>
<td>Macroeconomics</td>
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<td>Tech Course</td>
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### Sixth Semester

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<th>Subject</th>
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<tbody>
<tr>
<td>MCS2123</td>
<td>Statistics 2</td>
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<tr>
<td>SSC2323</td>
<td>Microeconomics</td>
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### Seventh Semester

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<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>MGT2203</td>
<td>Mgt &amp; Supervision</td>
<td>3</td>
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<td>SSC2413</td>
<td>Found Amer Exper</td>
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<td>XXX3</td>
<td>Tech Course</td>
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### Ninth Semester

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<tbody>
<tr>
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<tr>
<td>COM2103</td>
<td>Tech &amp; Prof Comm</td>
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<tr>
<td>XXX3</td>
<td>Tech Course</td>
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### Eleventh Semester

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<td>Org Behavior</td>
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<tr>
<td>XXX3</td>
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### Thirteenth Semester

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<th>Subject</th>
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<tbody>
<tr>
<td>LLT/SSC3</td>
<td>Jr/Sr Hum Elective</td>
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<td>MKT3103</td>
<td>Prin of Marketing</td>
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<tr>
<td>XXX2</td>
<td>Tech Course</td>
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### Tenth Semester

<table>
<thead>
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<th>Subject</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ACC2023</td>
<td>Principles Acctg</td>
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<tr>
<td>TOM3113</td>
<td>Operations Mgt</td>
<td>3</td>
</tr>
<tr>
<td>XXX3</td>
<td>Tech Course</td>
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### Twelfth Semester

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tbody>
<tr>
<td>COM3103</td>
<td>Adv Prof Comm</td>
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<tr>
<td>TIE2103</td>
<td>Prod &amp; Wrk Meas</td>
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### Fourteenth Semester

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<tr>
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<tr>
<td>MGT4213</td>
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<tr>
<td>TIE4115</td>
<td>Senior Projects</td>
<td>5</td>
</tr>
</tbody>
</table>

**Note:** Progress may be accelerated by completing additional courses in any semester including summer.

---

# Bachelor of Science in Construction Management

Courses required to complete the B.S.C.M. degree:

**Total Semester Credit Hours: 125**

### Math/Science Core

- MCS1023 Tech Comp Appl
- MCS1113 Tech Math 1
- MCS1123 Tech Math 2
- MCS2313 Tech Calculus
- MCS2023 Statistical Methods
- PHY1063 Tech Physics 1
- PHY1100 Tech Physics 1 Lab
- PHY1083 Tech Physics 2
- PHY1101 Tech Physics 2 Lab
- CHM3144 Fund Chemistry

### Humanities Core

- COM1001 University Seminar
- COM1103 English Composition
- COM2103 Tech & Prof Comm
- LHT1213 World Masterpcs 1
- LHT1223 World Masterpcs 2
- HRM3013 Organizational Behav
- SSC2413 Found of Amer Exper
- SSC2423 Dev of Amer Exper
- SSC3723 Ethics

### Management Core

- INT3023 Info Tech Inaugural
- HRM4013 Empl/Mgt Relations
- MGT2113 Intro to Business Law
- MGT2203 Mgt & Supervision
- SSC2303 Basic Economics
- TIE2163 Engr Econ & Acct

### Construction Science

- ARC2514 Structures 1
- ARC3523 Structures 2
- ARC4533 Structures 3
- TCE2143 Specs and Regulations
- TCE1023 Arch Graphics
- TCE2013 Constr Tech 1
- TCE2033 Soils
- TCE2053 Constr Tech 2
- TCEXXX3 Constr Tech 3
- TCE2073 Surveying

### Const & Mgt Electives

- INT3023 Info Tech Inaugural
- HRM4013 Empl/Mgt Relations
- MGT2113 Intro to Business Law
- MGT2203 Mgt & Supervision
- SSC2303 Basic Economics

### Management Core

- INT3023 Info Tech Inaugural
- HRM4013 Empl/Mgt Relations
- MGT2113 Intro to Business Law
- MGT2203 Mgt & Supervision
- SSC2303 Basic Economics

**Note:** Progress may be accelerated by completing additional courses in any semester including summer.
B.S.T.M. TECHNOLOGY CORE

Choose 1 major: Computer Technology, Construction Technology, Electrical Technology, Manufacturing Technology, or Mechanical Technology. Or, develop a unique major in another technology, in a branch of engineering, or in a natural science, e.g., chemistry, computer science, or environmental chemistry.

B.S.T.M. COMPUTER TECHNOLOGY MAJOR REQUIREMENTS
(10 courses)

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
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<td>Prod &amp; Work Meas</td>
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Plus at least seven courses from the following*:

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<td>MCS2514</td>
<td>Computer Science 2</td>
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<tr>
<td>MCS2524</td>
<td>Discrete Math</td>
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<tr>
<td>MCS2534</td>
<td>Data Structures</td>
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<td>MCS3543</td>
<td>Database Systems</td>
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<tr>
<td>MCS3653</td>
<td>Computer Architecture</td>
<td>3</td>
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<tr>
<td>MCS4623</td>
<td>Software Engineering</td>
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<td>MIS4013</td>
<td>Sys Develop Project</td>
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<td>MIS4023</td>
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B.S.T.M. CONSTRUCTION TECHNOLOGY MAJOR REQUIREMENTS
(10 courses)

<table>
<thead>
<tr>
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<td>TCE2013</td>
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<td>TCE2143</td>
<td>Specs &amp; Regulations</td>
<td>3</td>
</tr>
<tr>
<td>TIE2013</td>
<td>Prod &amp; Work Meas</td>
<td>3</td>
</tr>
<tr>
<td>TIE2123</td>
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Plus at least five courses from the following*:

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<tr>
<td>TCE2033</td>
<td>Soils</td>
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<tr>
<td>TCE2053</td>
<td>Construction Tech 2</td>
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<td>TCE2073</td>
<td>Surveying</td>
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<tr>
<td>TCE2093</td>
<td>Structures</td>
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<td>Estimating</td>
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<td>TME2013</td>
<td>Statics</td>
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<td>TME2033</td>
<td>Mechanics of Materials</td>
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B.S.T.M. ELECTRICAL TECHNOLOGY MAJOR REQUIREMENTS
(10 courses)

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>TEE2013</td>
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<td>TEE2033</td>
<td>Electronics 1</td>
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<td>TEE2053</td>
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<tr>
<td>TEE2073</td>
<td>Electrical Drawing</td>
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<tr>
<td>TIE2013</td>
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<tr>
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Plus at least three courses from the following*:

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<tr>
<td>TEE2123</td>
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<td>TEE2143</td>
<td>Electrical Machines</td>
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<tr>
<td>TEE2163</td>
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B.S.T.M. MANUFACTURING TECHNOLOGY MAJOR REQUIREMENTS
(10 courses)

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<tr>
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Plus at least three courses from the following*:

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B.S.T.M. MECHANICAL TECHNOLOGY MAJOR REQUIREMENTS
(13 courses)

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B.S.T.M. CONSTRUCTION TECHNOLOGY MAJOR REQUIREMENTS
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B.S.T.M. ELECTRICAL TECHNOLOGY MAJOR REQUIREMENTS
(10 courses)

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<td>TEE2073</td>
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Plus at least three courses from the following*:

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An Associate of Science degree may be earned en route to the B.S.T.M. degree with Construction, Electrical, Manufacturing, and Mechanical Technology majors by completing up to three additional courses.

* Or other courses approved by the program academic advisor.
# Associate of Science in Construction Engineering Technology

**Total Semester credit hours: 65**

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<th>Subject</th>
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*or Statistical Methods (MCS2023)*

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# Associate of Science in Electrical Engineering Technology

**Total Semester credit hours: 65**

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*or Statistical Methods (MCS2023)*

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# Associate of Science in Manufacturing Engineering Technology

**Total Semester credit hours: 65**

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*or Applied Differential Equations (MCS2323)*

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*or Statistical Methods (MCS2023)*

# Associate of Science in Mechanical Engineering Technology

**Total Semester credit hours: 65**

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<td>TME2123</td>
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<td>TME2033</td>
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<td>TEE2183</td>
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# Engineering Technology Advisor:

Contact the Technology Department, ext. 2060, Room E179, for your assigned faculty advisor.
COURSES COMMON TO ALL ASSOCIATE DEGREE PROGRAMS

COMMUNICATIONS
COM1001 University Seminar
COM1103 English Composition
COM2103 Technical and Professional Communication
Total Communications Credits: 7

MATHEMATICS
MCS1113 Technical Mathematics 1
MCS1123 Technical Mathematics 2
MCS2313 Technical Calculus
MCS2023 Statistical Methods or MCS2323 Differential Equations
MCS1023 Technical Computer Applications
Total Mathematics Credits: 15

SCIENCE
PHY1063 Technical Physics 1
PHY1100 Technical Physics Laboratory 1
PHY1083 Technical Physics 2
PHY1101 Technical Physics Laboratory 2
Total Science Credits: 7

SOCIAL SCIENCE
SSC2303 Basic Economics
Total Social Science Credits: 3

COURSE SCHEDULE FOR CONSTRUCTION ENGINEERING TECHNOLOGY

FALL OFFERINGS
TCE1023 Architectural Graphics**
TCE2013 Construction Tech 1**
TCE2073 Surveying
TIE2123 Project Management
TCE2093 Structures**

SPRING OFFERINGS
TME2013 Statics
TCE2033 Mech of Materials
TCE2033 Soils*
TCE2053 Construction Tech 2*
TCE2123 Estimating**
TCE2143 Specs & Regs**

COURSE SCHEDULE FOR ELECTRICAL ENGINEERING TECHNOLOGY

FALL OFFERINGS
TEE1023 Circuits 1**
TEE2053 Electronics 2*
TEE2073 Electrical Drawing*
TEE2163 Electronic Comm**
TEE2183 Industrial Elect**
TIE2123 Project Management

SPRING OFFERINGS
TEE2013 Circuits 2*
TEE2033 Electronics 1*
TEE2093 Electronics 3**
TEE2123 Microprocessors**
TEE2143 Electrical Mach**

COURSE SCHEDULE FOR MANUFACTURING ENGINEERING TECH

FALL OFFERINGS
TME1023 Technical Graphics*
TIE2063 Manu Processes 1
TIE2013 Prod & Work Meas
TEE2173 Auto Control Syst
TIE2123 Project Management

SPRING OFFERINGS
TME2143 Materials 1
TME2033 Mech of Materials
TIE2093 Metrology & QC
TIE2163 Engr Econ & Acct
TIE2153 Manu Processes 2**

COURSE SCHEDULE FOR MECHANICAL ENGINEERING TECHNOLOGY

FALL OFFERINGS
TME1023 Technical Graphics*
TME2033 Mech of Materials
TME2053 Dynamics
TME2073 Thermodynamics
TEE2173 Auto Control Syst
TME2163 Computer Graphics
TME2213 Mechanical Design

SPRING OFFERINGS
TME2013 Statics
TIE2063 Manu Processes 1
TME2123 Fluids
TME2143 Materials 1

* Generally offered in odd years.
** Generally offered in even years.
BACHELOR OF SCIENCE IN ENGINEERING TECHNOLOGY (B.S.E.T.)

**Total Semester credit hours: 60**

The B.S.E.T. degree is designed as a degree completion program. It is for students who already hold an associate degree or an Ontario college diploma in a Lawrence Tech approved technical discipline. Completion of the degree program requires a total of 125 credit hours; including transfer credit and completion of the following requirements and electives.

27 to 33 credit hours of technical specialty (from the associate degree or diploma program).

Students must complete the following Lawrence Tech courses or their equivalent. (Equivalent classes are evaluated and transferred into the program during the admission process.)

**Math and Computer Science (18 credit hours)**
- MCS1023 Technical Computer Applications
- MCS1113 Tech Math 1
- MCS1123 Tech Math 2
- MCS2313 Tech Calculus
- MCS2323 Applied Differential Equations
- MCS2023 Statistical Methods

**Science (11 credit hours)**
- PHY1063 Tech Physics 1
- PHY1100 Tech Physics 1 Lab
- PHY1083 Tech Physics 2
- PHY1101 Tech Physics 2 Lab
- CHM3144 Fundamentals of Chemistry

**Communications (7 credit hours)**
- COM1001 University Seminar
- COM1103 English Composition
- COM2103 Technical and Professional Communications

**Language and Literature (6 credit hours)**
- LLTXX3 Elective
- LLTXX3 Elective

**Social Sciences (9 credit hours)**
- SSCXX3 Elective
- SSC2303 Basic Economics
- SSC1213 Introductory Psychology or SSCXXX3 Elective

**Junior/Senior Elective (3 credit hours)**
- LLT3XX or LLT4XX or SSC3XX or SSC4XX

**Technical Core (29 credit hours)**
- HRM4013 Empl Mgt Relations
- MGT2203 Mgt and Supervision
- TEE3103 DC/AC Circuits
- TIE2063 Manufacturing Processes
- TIE2163 Engineering Economics and Accounting
- TIE4115 Senior Project
- TME2053 Dynamics (or TME3113 Engineering Mechanics for students who were not required to take Statics in the associate degree)
- TME4103 Engineering Materials 2
- TOM3113 Operations Management

**Technical Electives**

The technical specialty must have 33 credit hours of work. It is common for certain technical specialty classes from the associate degree program (e.g., Manufacturing Processes) to apply to the technical core of the B.S.E.T. In which case, the credit transferred from the technical specialty must be replaced. Technical electives are also used to assure that the student has 33 credit hours in their technical specialty.

**Open Electives (3 to 9 credit hours)**

Any Lawrence Tech class that is 1XXX or higher.
ASSOCIATE OF SCIENCE IN MANUFACTURING ENGINEERING/TECHNOLOGY
For students in the Greenfield Coalition Program only
Total Semester credit hours: 69

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MANUFACTURING ENGINEERING/TECHNOLOGY (Greenfield Coalition)
ADVISOR:
Sabah H. Abro, ext. 2069, VAX Username: SABAH, room E179
DEPARTMENT OF CIVIL ENGINEERING

PROFESSORS:
Nabil Grace
Alan L. Prasuhn (Chairperson)

ASSOCIATE PROFESSOR:
Edmund Ee-Mun Yuen

ASSISTANT PROFESSORS:
James Hanson
Tarek Rizk

LECTURERS:
Additional guest lecturers are assigned to selected courses and sections based on their specialties and expertise, and are listed in the faculty roster.

ECE1012 CIVIL ENGINEERING PERSPECTIVES
Prerequisite: High school trigonometry, MCS0093 or permission of the instructor.
Survey of the scope of civil engineering and the engineer's role in society. Professional issues including ethics, sustainable development, teamwork, and the history of the profession. Use of computers, and the measurement and presentation of data. Lect. 2 hrs., 2 hours credit

ECE1013 SURVEYING AND LAND MEASUREMENT
Prerequisite: MCS1414.
Introduction to the theory and practice of land surveying and measurements; leveling, traversing, profiles, contours, drafting, data collection and computation; earthwork; description, care and use of instruments; and the layout of buildings, utilities, and routes. Lect. 2 hrs., Lab. 3 hrs., Lab fee. 3 hours credit

ECE1103 CIVIL ENGINEERING COMPUTER APPLICATIONS LAB
Co-requisite: MCS1414 or permission of instructor. Introduction to the use of computers as a tool for solving problems. Use of spreadsheets, mathematical analysis programs, and autoCAD are emphasized. Lect. 2 hr., Lab. 2 hrs., Lab fee. 3 hrs. credit

ECE1413 CE MATERIALS
Co-requisite: ECE1103 or permission of instructor. Introduction to the analysis and use of civil engineering materials including concrete, asphalt, timber, composites, and metal structural materials. Laboratories include student-designed experiments. Lect. 2 hrs., Lab. 2 hrs. Lab fee. 3 hrs. credit

ECE2313 CONSTRUCTION ENGINEERING
Prerequisite: ECE1413.
Introduction to construction engineering, including construction methods, materials, and equipment. Factors affecting construction activities are examined, including costs, financing, labor relations, environmental regulations, permitting, and quality control. The relationship among owners, designers, contractors, and users. A thorough review of federal and state safety regulations. Lect. 3 hrs. 3 hours credit

ECE3723 THEORY OF STRUCTURES
Prerequisite: EME3013.
Calculations of reactions, and shear and bending moment in beams and frames; analysis of trusses by methods of sections and joints; deflection calculations; influence lines and moving loads for beams and trusses; introduction to statically indeterminate structures; computer applications. Lect. 3 hrs. 3 hours credit

ECE3823 TRANSPORTATION ENGINEERING
Prerequisites: ECE3012 and MCS3403. A systems approach to transportation for decision-making by the engineer. The five major modes of transportation are introduced to achieve modal balance for person and product transport. Evaluation of public transit for intra-urban travel. Elements for system design are identified, operational analysis and the coordinate use of modes emphasized. Lect. 3 hrs. 3 hours credit

ECE4021 CE DESIGN PROJECT 1
Prerequisite: Senior standing and permission of department chairman. Introduction to Senior Design Project (see ECE4033). A progress report is required. Lab fee. 1 hour credit

ECE4051 ETHICS AND PROFESSIONAL ISSUES
Prerequisite: Senior standing or permission of department chairman. Selected topics in engineering ethics, history of civil engineering, and other professional issues. Oral and written reports required. Lect. 1 hr. 1 hour credit

ECE4423 CIVIL ENGINEERING PRACTICES
Prerequisite: EGE3012.
Overview of business and management practices applied to organizations involved in civil engineering, including consulting design firms, construction contractors, private owners and government agencies. Budgeting, project programming revenue sources and company profitability. Organizational structures, and effective team-building methods. Oral and written communication skills are developed. Lect. 3 hrs. 3 hours credit

ECE4263 COST ESTIMATING, BIDDING AND CONTRACTING
Prerequisite: ECE3012.
Procedures and methods to prepare quantity measurements, estimate labor and equipment productivities, obtain material costs, and develop comprehensive estimates for construction. The bidding process, including consideration of new approaches such as design-build and partnering. Standard construction contract forms including unit-price, lump-sum, and cost-plus. Insurance, warranties, and bonding issues. Lect. 3 hrs. 3 hours credit
ECE4343 ENVIRONMENTAL ENGINEERING 2
Prerequisite: ECE3324. Waste water treatment, air pollution control and solid waste management; design of different unit operations and processes in waste water treatment. Characterization of municipal and industrial solid wastes; hazardous waste regulations. Design of landfill. Lect. 3 hrs. 3 hours credit

ECE4363 ENVIRONMENTAL ENGINEERING DESIGN
Co-requisite: ECE4544. Computer-aided design in environmental engineering systems including water resources and storm water management. Development of surface and groundwater sources. Design, construction, and maintenance of water distribution systems and sanitary and storm water collection systems. Lect. 3 hrs. 3 hours credit

ECE4443 FOUNDATION ENGINEERING
Prerequisite: ECE3424. Site investigation techniques; design of retaining walls; cantilever and anchored sheet pile walls; strutted excavations; and shallow and deep foundations. Lect. 3 hrs. 3 hours credit

ECE4544 HYDRAULIC ENGINEERING
Prerequisite: ECE3523. Analysis and design of pipeline and open-channel systems; river engineering and sediment transport; computer modeling; hydraulic machinery. Lect. 3 hrs., Lab. 2 hrs., Lab fee. 4 hours credit

ECE4563 HYDROLOGY
Prerequisites: ECE523 and MCS3403. Introduction to hydrologic cycle; stream gauging; unit hydrograph; flood routing; reservoir operation; groundwater hydraulics; application of probability and statistics to hydraulic design considerations; and drainage and culvert design. Lect. 3 hrs. 3 hours credit

ECE4623 PROJECT PLANNING, DESIGN, AND SCHEDULING
Prerequisite: Senior standing or permission of department chairman. The planning and design of work flow processes for civil projects; models of network theory, Critical Path Method (CPM), Program Evaluation Review Technique (PERT), and Precedence Diagramming Method (PDM), as applied to project scheduling. Class design project required, as well as computer applications. Lect. 2 hrs., Lab. 2 hrs., Lab fee. 3 hours credit

ECE4733 ADVANCED STRUCTURAL ANALYSIS
Prerequisite: ECE3723. Analysis of indeterminate structures by moment-area theorems, slope deflection equations, moment distribution and conjugate beam methods; deflection calculations; use of influence lines; computer applications. Lect. 3 hrs. 3 hours credit

ECE4743 CONCRETE DESIGN
Prerequisite: ECE3723. Use of working stress and ultimate strength methods toward the analysis and design of reinforced concrete structural members such as slabs, beams, and columns; comprehensive design project; computer applications. Lect. 3 hrs. 3 hours credit

ECE4753 STEEL DESIGN
Prerequisite: ECE3723. Static investigation of structures. Analysis and design of steel members such as tension members, columns, beams, plate girders, composite girders, and trusses including riveted, welded, and high tensile bolted connections using LRFD and ASD methods; computer applications. Lect. 3 hrs. 3 hours credit

ECE4761 STRUCTURAL DESIGN AND TESTING LAB
Co-requisite: ECE4743. Applications of structural analysis and design to the actual designed and constructed structural members such as reinforced and prestressed concrete, steel, wood, and aluminum girders. Lab. 2 hrs. Lab fee. 1 hour credit

ECE4843 HIGHWAY ENGINEERING
Prerequisites: ECE1013 and ECE3823. Introduction to highway organization, administration, and finance; user cost and economic analysis of project alter- natives. Study of driver and pedestrian behavior; analysis of vehicle maneuvers, geometrics, traffic flow for system design, capacity, signalization, and safety. Lect. 3 hrs. 3 hours credit

ECE4911-3 DIRECTED STUDY IN CIVIL ENGINEERING
Prerequisite: Permission of department chairman. Normally a written report required. Hours of credit designated by last digit in course number.

ECE4921-3 SPECIAL TOPICS IN CIVIL ENGINEERING
Prerequisite: Senior standing or permission of department chairman. In-depth study of a particular civil engineering topic. Normally a written report required. Hours of credit designated by last digit in course number.

ECE4923-3 ADVANCED CONSTRUCTION TECHNIQUES AND METHODS
Prerequisite: Graduate standing or permission of department chairperson. An in-depth evaluation of current and emerging construction techniques and methods that are designed to improve the constructability, performance and life-cycle costs of civil infrastructure projects. New materials, design approaches and construction techniques are investigated by examination of specific experiences in the construction industry. Lect. 3 hrs. 3 hours credit

ECE5253 RISK MANAGEMENT AND PERSONNEL
Prerequisite: Graduate standing or permission of department chairperson. The many risks and liabilities associated with construction, including safety and insurance issues. A detailed analysis of the human factor in construction, including allocation and utilization of personnel, recruitment and training. Labor relations and related contractual issues are evaluated. Lect. 3 hrs. 3 hours credit

ECE5323 ENVIRONMENTAL CLEANUP
Prerequisite: ECE4343 or equivalent; Graduate standing or permission of department chairperson. Remediation management at contaminated sites involving remedial investigation/feasibility study process. Remedial investigation focuses on data collection and site characterization. Feasibility study emphasizes data analysis and decision making on applicable remedial technologies. Discussion of subsurface transport and fate of contaminants. Lect. 3 hrs. 3 hours credit
ECE5343 ADVANCED ENVIRONMENTAL ENGINEERING
Prerequisite: ECE4343 or equivalent; Graduate standing or permission of department chairperson. Recent advances in the design of unit operations in water and wastewater treatment plants. New developments in natural systems for waste management and treatment practices. Microcomputer applications. Lect. 3 hrs. 3 hours credit

ECE5363 SURFACE WATER QUALITY MANAGEMENT
Prerequisite: ECE4343 or equivalent; Graduate standing or permission of department chairperson. Management models in the cause-effect analysis of water quality in surface water bodies such as lakes, estuaries, bays, harbors, streams and rivers. Waste load allocation management strategies to reduce waste inputs to surface water bodies. Water quality modeling and control in the transport and fate analysis of contaminants in surface water. Lect. 3 hrs. 3 hours credit

ECE5423 GEOENVIRONMENTAL ENGINEERING
Prerequisite: Graduate standing or permission of department chairperson. Waste containment facilities design, construction and operation; including linear systems and geosynthetics, interaction of soil with chemicals, and transport of chemicals and water in soils. Lect. 3 hrs. 3 hours credit

ECE5433 GROUND IMPROVEMENT METHODS FOR FOUNDATIONS
Prerequisites: ECE3424; Graduate standing or permission of department chairperson. Practical and innovative design methods for ground improvement related to soft ground, deep foundations, slope stability, seismic activity, and geosynthetics. Combines investigation of case histories, current projects, design methodology, and geotechnical engineering theory. Lect. 3 hrs. 3 hours credit

ECE5713 ANALYSIS AND DESIGN OF PRESTRESSED CONCRETE
Prerequisite: ECE4743 or equivalent; Graduate standing or permission of department chairperson. Use of prestressed concrete in infrastructure applications: prestressing principles, analysis and design of pre- and post-tensioned systems, losses, flexure, shear, bond, camber and deflection, continuous prestressing, columns, and circular prestressing. Use of advanced composite materials such as prestressing strands to solve infrastructure problems. ACI and PCI prestressed concrete design manual discussed. Lect. 3 hrs. 3 hours credit

ECE5733 ADVANCED COMPOSITE MATERIALS AND THEIR USES IN STRUCTURES
Prerequisite: ECE4743 or equivalent; Graduate standing or permission of department chairperson. Definitions, mechanical properties and durability of advanced composite materials. Protruded sections and fiber reinforced plastic (FRP) bars. Concrete structures reinforced and/or prestressed with FRP bars; behavior and strength in bending and shear. Repairs and rehabilitation of structures. New applications and design concepts. Lect. 3 hrs. 3 hours credit

ECE5743 INTRODUCTION TO STRUCTURAL DYNAMICS
Prerequisite: ECE4733 or equivalent; Graduate standing or permission of department chairperson. Practical analysis and design of real structures; basic theory and numerical analysis of one- and two-degree elastic systems; lumped-mass multi-degree systems; distributed mass and load, approximate design approach, earthquake analysis, and earthquake design. Lect. 3 hrs. 3 hours credit

ECE5763 ADVANCED ANALYSIS AND DESIGN OF STRUCTURES
Prerequisite: ECE4733 or equivalent; Graduate standing or permission of department chairperson. A unified presentation of the entire field of structural analysis, including introduction to the analysis of indeterminate structures, force method analysis and applications, displacement method analysis and applications, analysis of shear walls, plastic analysis of continuous beams and frames, and concrete, steel and wood design topics. Lect. 3 hrs. 3 hours credit
EEE3311 ELECTRONICS LAB
Co-requisite: EEE3113.
Experiments on power supplies voltage regulators, transistor class A amplifiers, timers, simple operational circuits, active filters, sample and hold circuits are performed. Lab. 2 hrs., Lab fee. 1 hour credit

EEE3313 ELECTRONICS
Prerequisite: EEE3123. Study and design of passive and active semiconductor devices, circuits, operational amplifiers, voltage comparator circuits and non-linear circuits, design of power supplies, voltage regulators, and timers. Lect. 3 hrs. 3 hours credit

EEE3414 ELECTROMAGNETIC FIELDS AND WAVES
Prerequisite: PHY2423. Vector analysis. Electrostatics and magnetostatics in free space. Fields in the presence of engineering materials. Time-varying fields and Maxwell's equations. Plane electromagnetic waves. Transmission line theory. Lect. 4 hrs. 4 hours credit

EEE3422 ADVANCED COMPUTER APPLICATION LAB
Prerequisites: MCS3413, EEE3123, Co-requisite: EEE3313. Computer techniques for electrical engineering, including matrix methods and solution of differential and integral equations. Application of specialized programs for solving engineering problems. Use of computer simulation techniques. Lect. 1 hr., Lab 2 hrs. 2 hours credit

EEE3511 INTRODUCTION TO ELECTRICAL SYSTEMS LAB
Co-requisite: EEE3513.
Electrical safety, measurement of single phase and three phase AC voltages, currents and power. Transformers, relays, torque, power, and rotational speed. Lab 2 hrs. 1 hour credit

EEE3513 INTRODUCTION TO ELECTRICAL SYSTEMS
Prerequisite: EEE3123. Phasors, single phase AC power, three phase systems, three phase power, magnetic circuits, relays, transformers. Fundamentals of rotating machinery. National Electric Code, short circuit current calculations, fuses and circuit breakers. Lect. 3 hrs. 3 hours credit

EEE4131 ELECTRICAL MACHINERY LAB
Co-requisite: EEE4133.
Electrical and rotating machine safety, measurement of current, power, torque, and efficiency of DC machines, and synchronous machines. Determination of machine model parameters, controller control of electric machines. Lab 2 hrs. 1 hour credit

EEE4133 ELECTRICAL MACHINERY
Prerequisite: EEE3513, Co-requisite: EEE4131.
Steady state and dynamic modeling of DC machines, induction machines, and synchronous machines. Power, torque, loss mechanisms, efficiency. Power electronic control of electric machinery. Lect. 3 hrs. 3 hours credit

EEE4231 MICROPROCESSORS 2 LAB
Prerequisite: EEE3231, Co-requisite: EEE4233.
Study and design of hardware aspects of computer technology, including memory, interface, and I/O circuitry, interrupt and exception protocols. The lab will include a major student project incorporating the principles studies in EEE4233. Lab. 2 hrs. 1 hour credit

EEE4233 MICROPROCESSORS 2
Prerequisite: EEE3233, Co-requisite: EEE4231. A continuation of Microprocessors 1, emphasizing the hardware aspects of computer technology. Specific architectures studied include advanced Intel and Motorola processors, and various memory and I/O devices and strategies. Lect. 3 hrs. 3 hours credit

EEE4241 EMBEDDED SYSTEMS LAB
Co-requisite: EEE4243.
Course development using a microcontroller evaluation module board (EVB); design of experiments using an EVB development tool; various I/O interfacing design examples. Term design project. Lab 2 hrs. 1 hour credit

EEE4243 EMBEDDED SYSTEMS
Prerequisite: EEE3233.
Utilization of microcontrollers in design of instruments and embedded controllers. Description of on-chip resources, programming framework, parallel I/O, main timer and real-time interrupt, pulse accumulator, A/D converter and serial communication subsystems. Interfacing techniques. Lect. 3 hrs. 3 hours credit

EEE4253 COMPUTER NETWORKING LABORATORY
Co-requisite: EEE4263.
Local asynchronous communication; extending LANs-modems, repeaters, bridges; switches; packet switches; service paradigms; protocols and layering; binding protocol address; network management software; network security-filtering, firewalls. Lab 2 hrs. 1 hour credit

EEE4261 COMPUTER NETWORKING LABORATORY
Co-requisite: EEE4263. Local asynchronous communication; extending LANs-modems, repeaters, bridges; switches; packet switches; service paradigms; protocols and layering; binding protocol address; network management software; network security-filtering, firewalls. Lab 2 hrs. 1 hour credit

EEE4263 COMPUTER NETWORKING
Prerequisites: EEE2114, EEE3223. Local asynchronous communication; extending LANs-modems, repeaters, bridges; switches; packet switches; service paradigms; protocols and layering; binding protocol address; network management software; network security-filtering, firewalls. Course contains lecture and laboratory sections. Lect. 3 hrs. 3 hours credit

EEE4321 ADVANCED ELECTRONICS LAB
Co-requisite: EEE4323.
Using simulation programs to solve circuit problems. Circuit analysis using non-ideal Op-Amps; precision rectifier circuits, timer circuits; designing wave generators; frequency to voltage converters, sample and hold circuits; active filters. Lab 2 hrs. 1 hour credit

EEE4323 ADVANCED ELECTRONICS
Prerequisite: EEE3313.
Advanced power supply design and switch mode regulator. Switch capacitor design. Phase locked loop design and applications. Instrumentation amplifier and isolation amplifier. Frequency to voltage converter and voltage to frequency converter. Voltage to current converter and 4-20mA current loop. Lect. 3 hrs. 3 hours credit
EEE4333 AUTOMOTIVE ELECTRONICS
Prerequisites: EEE3233, EEE3313, EEE4513. Introduction to principles of automotive electronics. Basic function of automotive engine and vehicles. Vehicle power supply. Electrical, temperature, environmental requirements. Electronic ignition. Electronic engine and transmission management, including open and closed loop control design, diagnostics. Vehicle controls: system concept, sensors, actuators, control design, diagnostics. Instrumentation principles. Example hardware systems. Introduction to electric vehicles. Lect. 3 hrs. 3 hours credit

EEE4343 ELECTRONIC NOISE REDUCTION
Prerequisite: EEE3313. Electromagnetic compatibility design techniques, interference problems, grounding and other noise reduction techniques, passive components, shielding, intrinsic and active noise sources, digital circuit noise and radiation. Lect. 3 hrs. 3 hours credit

EEE4423 COMMUNICATION SYSTEMS
Prerequisites: MCS3403, EEE3213. Fourier series and transforms, random variables, noise analysis. Amplitude and frequency modulation, digital pulse code modulation. Multiplexing techniques. Channel bandwidth limitations, and channel coding techniques. Spread spectrum systems. System designs for telecommunications, link budgets. Lect. 3 hrs. 3 hours credit

EEE4433 ANTENNAS AND RADIATION
Prerequisite: EEE3414. Review of Maxwell's equations. Electromagnetic formulation for radiating systems. Antenna definitions and terminology. Patterns of various point source models. Point source arrays. Thin wire, aperture, reflector, and broadband antennas. Introduction to radio wave propagation, communication links and radar. Lect. 3 hrs. 3 hours credit

EEE4511 CONTROL SYSTEMS LAB
Co-requisite: EEE4513. Application of control system design and techniques. Physical system parameter determination, prediction of performance, interpreting and satisfying design criteria, implementation of compensator networks. Lab. 2 hrs. 1 hour credit

EEE4513 CONTROL SYSTEMS
Prerequisites: EEE3123 and EEE3313. Convolution, linear systems models and equations, block diagrams, signal flow graphs, time and frequency response of systems, root locus, Bode plots, Nyquist plots, stability, compensators, control system design methods, computer simulations. Lect. 3 hrs. 3 hours credit

EEE4541 PROCESS CONTROL LAB
Co-requisite: EEE4543. Simulation of industrial process control using programmable logic controllers, simulation software, and scale model systems. Lab 2 hrs. 1 hour credit

EEE4543 PROCESS CONTROL
Prerequisites: EEE3233, EEE4513, Co-requisite: EEE4541. Design and implementation of industrial controllers using programmable logic controllers. Relay ladder logic, electrical schematic symbols, programmable logic controllers, interface circuitry, operator safety, state machines, Grafcet, PID controllers. Lect. 3 hrs. 3 hours credit

EEE4583 INSTRUMENTATION AND SENSOR TECHNOLOGY
Prerequisite: EEE3313. Analyze and design signal conditioning circuits for measuring temperature, force, pressure, flow, and fluid level. Interfacing techniques such as voltage to frequency. Converter, A to D, 4-20mA current loop and multiplexing. Lect. 3 hrs. 3 hours credit

EEE4613 SOLID STATE TECHNOLOGY

EEE4713 OPTOELECTRONICS
Prerequisites: EEE3313, EEE3414. Optical beams, laser fundamentals, laser systems, semiconductor structure, LED's, injection lasers, thermal detectors, optical detectors, optical beam deflection and modulation, integrated optics, optical fiber systems and components. Emphasis on optical fiber systems. Lect. 3 hrs. 3 hours credit

EEE4812 EE PROJECTS 1
Prerequisite: Senior standing. Principles of project design, including project specifications, planning, setting milestones, and project management. Students working in groups must complete the design phase of a major design project. The project incorporates the practices and principles learned in the computer engineering curriculum, and each project should include a design that incorporates both computer hardware and software principles. Students in each of the groups must present an oral and written project proposal early in the term, a written midterm progress report, and a formal written and oral presentation at the end of the term. Each team works closely with a faculty advisor. 2 hours credit

EEE4822 EE PROJECTS 2
Prerequisite: EEE4812. Continuation of EEE4812, Projects 1, and includes the construction and testing phase of the design project. Students are required to give a mid-term written and oral progress report, and a final formal written and oral presentation. Students are expected to display their projects during the annual Lawrence Tech Open House. 2 hours credit

EEE4832 COMPUTER ENGINEERING PROJECTS 1
Prerequisite: Senior standing. Principles of project design, including project specifications, planning, setting milestones, and project management. Students working in groups must complete the design phase of a major design project. The project incorporates the practices and principles learned in the computer engineering curriculum, and each project should include a design that incorporates both computer hardware and software principles. Students in each of the groups must present an oral and written project proposal early in the term, a written midterm progress report, and a formal written and oral presentation at the end of the term. Each team works closely with a faculty advisor. 2 hours credit

EEE4842 COMPUTER ENGINEERING PROJECTS 2
Prerequisite: EEE4832. Continuation of EEE4832 Computer Engineering Projects 1, and includes the construction and testing phase of the design project. Students are required to give a mid-term written and oral progress report, and a final formal written and oral presentation. Students are expected to display their projects during the Lawrence Tech Open House. 2 hours credit
EEE4851 SENIOR SEMINAR  
Prerequisite: Senior standing.  
Technical and professional topics including engineering design techniques, engineering ethics, history of electrical and computer engineering, careers in electrical and computer engineering, and professional practice. Speakers with industry, university, and government experience present the lecture material. Mandatory lecture attendance and a written report required. Lect. 1 hr.  1 hour credit

EEE4911-3 DIRECTED STUDY IN ELECTRICAL ENGINEERING  
Prerequisite: Senior standing and permission of the department chair. In-depth study of a particular electrical engineering topic. An approval form outlining the proposed study must be submitted and approved prior to course registration. (Hours of credit designated by last digit in course number.)

EEE4921-3 SPECIAL TOPICS IN ELECTRICAL ENGINEERING  
Prerequisite: Senior standing. Material of a specialized nature not covered in other courses that is of interest to both faculty and students. (Hours of credit designated by last digit in course number.)

EEE5273 IMAGE PROCESSING  
Prerequisite: Senior standing. Image understanding, image enhancement and restoration, image encoding design, feature extraction, image interpretation, object recognition and applications. Design of an object-recognition technique. Lect. 3 hrs.  3 hours credit

EEE5523 MODERN CONTROL SYSTEMS  
Prerequisite: EEE4513. State space realization of transfer functions, canonical forms, fundamental and state transition matrices, introduction to optimal control, quadratic performance indices, observers, Liapunov stability theory. Lect. 3 hrs.  3 hours credit

EEE5533 DIGITAL CONTROL SYSTEMS  
Prerequisite: EEE5523. Discrete time mathematics, Z transforms, sampling rates, zero and first order hold, time delays, system stability, continuous and discrete time systems interfacing, computer control implementation concepts, state space realization. Lect. 3 hrs.  3 hours credit

EEE5553 APPLICATION OF ARTIFICIAL INTELLIGENCE  
Prerequisite: EEE3313. System design using AI; LISP programming language, intelligent vision and imaging systems, data base search methods, logic and deduction using predicate calculus, expert system design, applications to robotics. Lect. 3 hrs.  3 hours credit

EEE5563 INTERFACEING AND CONTROL OF ROBOTS  
Prerequisites: EEE3233, EEE4513. Shaft encoders, actuators, robot coordinate systems, kinematics, path control, sensors, robot vision, design of robot interfaces. Lect. 3 hrs.  3 hours credit

EEE5623 VLSI DESIGN  
Prerequisite: EEE4613. Specification of MOSFETS and CMOS, IC fabrication, mask design, semi-custom and full-custom designs, application-specific integrated circuit design, and system design. Lect. 3 hrs.  3 hours credit

EEE5633 OPTICAL SYSTEM ENGINEERING  

EEE5653 DIGITAL SIGNAL PROCESSING  
Prerequisite: EEE3233; Co-requisite: EEE4513. Sampling theory and sampling hardware. Z transform. Architecture of VLSI digital signal processors. Design and implementation of real time polynomial, Fir, IIR, and adaptive filters. Spectral analysis with FFT. Design of DSP application in communication and digital control. Lect. 3 hrs.  3 hours credit
DEPARTMENT OF ENGINEERING TECHNOLOGY

ASSOCIATE PROFESSORS:
Donald F. Condit
Stanley F. Harris
William L. White (chairperson)

COLLEGE PROFESSOR:
Sabah H. Abro

LECTURERS:
Additional guest lecturers are assigned to selected courses and sections based on their specialties and expertise, and are listed in the faculty roster.

TCE2013 CONSTRUCTION TECHNIQUES 1
Prerequisite: 0.
The function, quality and cost of various building materials and methods used in the construction of residential, commercial, industrial, and other constructions including churches, hospitals and schools. Materials include wood, concrete, masonry, glass, metals, plastics, asphaltic and composite materials, etc. Methods include those utilized when making site investigations; excavating techniques and all types of foundations, framing systems; project scheduling; and any other new concepts and techniques of construction, construction equipment and safety. Lect. 3 hrs., Lab 1 hr.

3 hours credit

TCE2033 SOILS
Prerequisites: PHY1083, PHY1101. Study, analysis, classification, and strength of soil as found in nature and as altered by humans: changes in gradation, moisture content, density, and material for enhancement of soil as a construction material. Other natural and man-made construction materials are examined through analysis of test results, most notably those utilizing natural materials in both bituminous and portland cement concretes. Lect. 2 hrs., Lab. 2 hrs.

3 hours credit

TCE2053 CONSTRUCTION TECHNIQUES 2
Prerequisites: PHY1083, PHY1101, MCS2313, TCE2013.
Layout and installation of building electrical and mechanical systems, including codes, standards, and laws. Electrical systems to include equipment, lighting, sound and alarm systems, and standby equipment; mechanical systems to include water and sewerage systems, principles of ventilation, heating and cooling for industrial, commercial, and institutional buildings, total energy systems, fire protection equipment and installations, interior transportation systems, and acoustical or radiation protection used in construction. Lect. 3 hrs., Lab. 3 hrs.

3 hours credit

TCE2073 SURVEYING
Prerequisite: MCS1123.
Introduction to the principles of plane surveying using tape, transit and level. The measurement of angles as well as horizontal and vertical distances, traverse, stadia surveying and mapping, and general construction surveys. A computer is used for balancing a traverse. Lect. 2 hrs., Lab. 2 hrs.

3 hours credit

TCE2093 STRUCTURES
Prerequisites: MCS1023, TCE1023, TME2013, TME2033.
Detailing of steel structures; framed beam details; details for standard connections, seated connections; typical floor beam details; riveted, bolted and welded connection; detail drawing of compression, tension and flexible member; column details. Both drawing and computer labs utilized in the study of structural design principles. Lect. 2 hrs., Lab. 2 hrs.

3 hours credit

TCE2123 ESTIMATING
Prerequisites: TCE1023, TCE2013. Methods of estimating materials and labor required to erect a building. Excavations, foundations, utilities, steelwork, carpentry, roofing, drywall, painting, etc. The computer lab is utilized for assembling partial (trade) and complete construction estimates. Lect. 2 hrs., Lab. 2 hrs.

3 hours credit

TCE2143 SPECIFICATIONS AND REGULATIONS
Prerequisites: TCE1023, TCE2013. National (BOCA) and local codes, ordinances and regulations pertaining to commercial, industrial, and residential construction. Interpretation and evaluation of specifications for building construction. Emphasis on descriptive, proprietary, reference standard, performance, and cash allowance specification writing. Lect. 3 hrs.

3 hours credit

TEE1023 CIRCUITS 1
Prerequisites: MCS1123, MCS1023, PHY1083, PHY1101.
Introduction to electrical and electronic fundamentals. Basic principles involved in DC circuits, study of networks with multiple branches and multiple sources of emf, the application of Thevenin and Norton’s theorems, magnetic circuits, capacitance, inductance and transients in DC circuits. Lect. 3 hrs., Lab. 1 hr.

3 hours credit

TEE2013 CIRCUITS 2
Prerequisites: MCS2313, TEE1023. Basic principles involved in AC circuit analysis, phasors, series and parallel circuits, mesh and nodal analysis, network theorems, power, resonance, polyphase systems, and transformer. Lect. 3 hrs., Lab. 1 hr.

3 hours credit
TEE2033 ELECTRONICS 1
Prerequisites: MCS2313, TEE1023. Co-requisite: TEE2013. Solid state theory, diodes and diode applications, bipolar transistors and circuit configurations, biasing, small signal amplifiers, power amplifiers, bandwidth, FETs and FET amplifiers. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TEE2073 ELECTRICAL DRAWING
Prerequisites: MCS1023, TEE2033. Practical drawing of electrical and electronic circuits, design of printed circuit boards, house wiring and control circuits. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

TEE2093 ELECTRONICS 3
Prerequisite: TEE2053. Introduction to logic, design, logic gates and symbols, combinational and sequential logic, counters, shift registers, NAND and NOR logic design, A/D and D/A conversion. Introduction to computer hardware. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TEE2123 MICROPROCESSORS
Co-requisite: TEE2093. Microprocessor and microcomputer hardware, structure and programming theory are stressed. Interfacing techniques, digital codes, assembly language programming; I/O control and interrupt handling. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TEE2143 ELECTRICAL MACHINERY
Prerequisite: TEE2013. Energy conversion using electromechanical devices, DC and AC motors and generators, transformers, feedback and control, stepping, synchronous and induction motors. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TEE2163 ELECTRONIC COMMUNICATIONS
Prerequisites: TEE2013, TEE2053. Principles of electronic communication, amplitude and frequency modulation, single-side-band communications, transmission lines and wave propagation. Lect. 3 hrs. 3 hours credit

TEE2173 AUTOMATIC CONTROL SYSTEMS
Prerequisites: MCS2313, PHY1083, PHY1101. Introduction to automatic control systems. Primary emphasis on electrical, electronic, and mechanical systems and their components. Hydraulic, pneumatic, temperature control systems and associated computer process control systems are introduced. Lab demonstrations and assignments are included. Lect. 3 hrs. 3 hours credit

TEE2183 INDUSTRIAL ELECTRONICS
Co-requisite: TEE2093. Theory, units, symbols, and mathematical foundation of electromechanical feedback control systems. Transducers applied to industrial controls including positional encoders, optical devices, and display system characteristics. Applications of analog and digital components, and microprocessors, to industrial controls. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TEE3103 DC/AC CIRCUITS
Prerequisites: Junior standing, MCS2313, MCS1023, PHY1083, PHY1101. Introduction to electrical fundamentals. Basic principles involved in DC circuits, study of networks with multiple branches and multiple sources of emf, magnetic circuits, capacitance, inductance and transients in DC circuits. Basic principles involved in AC circuit analysis, phasors, series and parallel circuits, mesh and nodal analysis, network theorems, power, resonance, polyphase systems, and transformer. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TEE2034 PRODUCTIVITY AND WORK MEASUREMENT
Prerequisites: MGT2203, COM2103. Productivity and its influences; selecting aspects of work performance to measure; traditional industrial engineering approaches to analyzing, measuring, and improving work methods; and systems approaches to productivity improvement. Lect. 3 hrs., 3 hours credit

TEE2063 MANUFACTURING PROCESSES 1
Prerequisite: 0. Fundamentals of machining operations including the study of carbide cutting tools and conventional machining operations such as turning, drilling, boring, milling, broaching, and grinding; metal casting and coating processes, plastic molding, powder metallurgy, metal stamping and forming, bulk deformation of metals, welding and related processes with lab demonstrations. Lect. 3 hrs. 3 hours credit

TEE2093 METROLOGY & QUALITY CONTROL
Prerequisites: MCS2023, MCS1023. All phases of metrology and quality control organization & objectives, including measurement, inspection methods, equipment and statistical techniques, utilized in business & industry. Practical application for controlling quality through hands-on project development and solution, SPC, charting, computer sampling and analysis programs, and cost considerations in quality planning. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

TEE2123 PROJECT MANAGEMENT
Prerequisite: MCS1023. A systematic method for organizing and directing personnel, finances, and other resources in planning, scheduling, and controlling projects. Students are introduced to project management computer programs and work on assigned projects. Lect. 3 hrs. 3 hours credit
TIE2153 MANUFACTURING PROCESSES 2
Prerequisites: Sophomore standing, TIE2063. Capstone course showing the fundamentals of process engineering including part print, dimensional and tolerance analysis. The study of tolerance charts and workpiece control, classifying operations, selection and planning the process of manufacture, and the manufacturing sequence. Introduction to metrology, geometric dimensioning and tolerancing as well as simultaneous engineering. Lab project. Lect. 3 hrs., Lab 1 hr. 3 hours credit

TIE2163 ENGINEERING ECONOMICS AND ACCOUNTING
Prerequisite: MCS1023. Introduction to several analytical methodologies which can be used to evaluate the financial performance of capital projects and expenditures. Concepts of time value of money, cash flow, capital rationing, rate of return, and effects of inflation are addressed. Accounting concepts such as depreciation, exchanges of assets, definition of income and differential costing. Lect. 3 hrs. 3 hours credit

TIE4115 SENIOR PROJECT
Prerequisites: Senior standing, COM2103. Students brainstorm product ideas; do a market survey on a selected product; conduct a patent search; design, construct and demonstrate a working model both in class and public display. An engineering cost analysis, manufacturing feasibility and a marketing plan are done. Several oral presentations and work outside the classroom required. 5 hours credit

TIE2023 TECHNICAL GRAPHICS
Prerequisite: 0. Concepts of mechanical drawing with emphasis on visualization; includes dimensioning, sectioning and tolerancing. Fundamentals of orthographic, isometric and auxiliary projections and experience of applying these principles to the solution of space problems. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

TME2013 STATICS
Prerequisites: MCS2313, MCS1023, PHY1063. Analytical and graphical study of forces, moments and couples. Determination of the resultant and equilibrium of all types of force system (ex-coplanar, concurrent non-parallel systems), solution of truss problems by methods of joints and methods of sections. Theory of static friction with related problems. Determination of centroids of composite bodies. Several problems are solved by computer. Lect. 3 hrs. 3 hours credit

TME2033 MECHANICS OF MATERIALS
Prerequisite: TME2013. Methods for the calculation of shear, tension, torsion, and compression stresses in industrial materials. Design and analysis of engineering structures, analysis of statically determinate beams. Experimentation in tensile, structure deflection, shear, and fatigue failure. The computer is used for problem solving and analysis. Lect. 3 hrs. 3 hours credit

TME2053 DYNAMICS
Prerequisite: TME2013. Analytical study of the motion of rigid bodies. Inertia, mass, Newtons laws of motion, equations rotation, plane motion, moment of inertia, and radius of gyration are covered. Angular velocity analysis of compound and epicyclic gear trains, displacement, velocity and acceleration analysis of mechanisms. Lect. 3 hrs. 3 hours credit

TME2073 THERMODYNAMICS
Prerequisites: MCS2313, PHY1083, PHY1101. Work, heat, pressure, first law of thermodynamics, thermodynamic systems, properties, energy transfers, conservation, equations of state, process calculations, entropy, p-v and t-s diagrams and air tables. Complete cycles, second law, internal combustion engines, irreversibility, gas turbines. Included are topics in heat transfer and numerical analysis. Lect. 3 hrs. 3 hours credit

TME2123 FLUIDS
Prerequisites: MCS2313, PHY1083, PHY1101, TME2013. The principles of fluid mechanics and applications to practical applied problems. Hydrostatics pressures, manometers, U-tube, buoyancy, and stability; hydrodynamics laminar and turbulent

TME2143 MATERIALS 1
Prerequisites: PHY1083, PHY1101. Properties of materials, test methods and the influence of changes in physical conditions and chemical composition on the properties of metals, alloys, polymers, woods, ceramics, and glass. Laboratory demonstrations will include metallography, hardness testing techniques, polymer deformation, and composites. Lect. 3 hrs. 3 hours credit
TME2163 COMPUTER GRAPHICS
Prerequisites: MCS1023, TME1023. Introduction to design, utilizing CAD system hardware, particularly microcomputer equipment in conjunction with system software. Techniques in creating two and three dimensional points, lines, curves, arcs, and components used in technical drawing and mechanical design. Created digital data is transferred to hard copy on system plotters. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

TME2213 MECHANICAL DESIGN
Prerequisites: Sophomore standing, TME2033, TME2143. Preparation of sketches, drawings of components, assemblies, and design calculations. Emphasizes design decision making concepts and appropriate application of dimensioning, tolerancing, applicable standards, and conventions. Students develop solutions to practical mechanical design problems and team projects presented to the class. Students are expected to utilize previously acquired MET program skills. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit

TME3113 ENGINEERING MECHANICS
Prerequisites: Junior standing, MCS1023, MCS2313, PHY1063. Analytical and graphical study of static forces, moments and couples. Determination of the resultant and equilibrium of all types of force system (ex-coplanar, concurrent non-parallel systems). Theory of static friction with related problems. Determination of centroids of composite bodies. Analytical study of the motion of rigid bodies. Inertia, mass, Newtons laws of motion, equations rotation, plane motion, angular velocity analysis of compound and epicycle gear trains; displacement, velocity and acceleration analyses of mechanisms. Lect. 3 hrs. 3 hours credit

TME4103 ENGINEERING MATERIALS 2
Prerequisites: Junior standing, CHM3144. Properties of metals, alloys, polymers, wood, glass and ceramic materials. The influence of physical conditions and chemical composition on these properties. Metaliographic techniques, sample treatment testing techniques. Lect. 3 hrs., Lab. 1 hr. 3 hours credit

TOM3113 OPERATIONS MANAGEMENT
Prerequisites: MGT2203 and MCS2113 or MCS2023. An overview of production functions in both manufacturing and service organizations. Forecasting, capacity planning, product and service system design, aggregate planning, inventory and project management, and quality assurance. Lect. 3 hrs. 3 hours credit

TOM4093 INDEPENDENT STUDY IN OPERATIONS MANAGEMENT
Prerequisites: Senior standing and faculty approval. Under the guidance of a faculty member, students conduct an intensive investigation of a topic within the field of manufacturing. A written proposal is required for approval. Projects typically include library research, interviews with operating and/or staff managers, and other requirements appropriate to the topic. One of the products of this project is a report. 3 hours credit

COOPERATIVE EDUCATION IN ENGINEERING TECHNOLOGY

TCO3001 CO-OP PRACTICUM I
Prerequisites: Junior standing, completion of associate degree, 2.25 LTU GPA, departmental approval. First full-time work assignment providing engineering technology experience in the workplace. 1 hour credit

TCO3101 CO-OP PRACTICUM II
Prerequisites: Satisfactory completion of TCO3001, departmental approval. Second full-time work assignment providing engineering technology experience in the workplace. 1 hour credit

TCO4001 CO-OP PRACTICUM III
Prerequisites: Satisfactory completion of TCO3101, departmental approval. Third full-time work assignment providing engineering technology experience in the workplace. 1 hour credit
COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

PROFESSORS:
Stephen K. Howell (chairperson)
Harold Josephs
Sayed A. Nassar
Patricia M. Shamamy
Khalil S. Taraman

ASSOCIATE PROFESSORS:
Daw R. Al-Werfalli
Clarence G. Chambers, emeritus
Vernon M. Fernandez
Lewis G. Frasch
Laura L. Lisiecki
Mehmet H. Uras
Kingman E. Yee

ASSISTANT PROFESSOR:
Badih Jawad
Chris H. Riedel

COLLEGE PROFESSOR:
Suresh C. Bansal

SENIOR LECTURER:
Shana B. Herrin

LECTURERS:
Additional guest lecturers are assigned to selected courses and sections based on their specialties and expertise and are listed in the faculty roster.

EGE1012 INTRODUCTION TO ENGINEERING
Prerequisite: Permission of instructor. Survey of the scope of engineering and the engineer’s role in society. Basic engineering tools such as math modeling, calculator usage and graphic design principles. Design project involving teamwork required. Lect. 2 hrs. 2 hours credit.

EGE1023 ENGINEERING MATERIALS I
Prerequisite: CHM1213. Introduction to solid materials, equilibrium phase diagrams, the properties of materials, test methods, and the influence of varia-

EGE102 ENGINEERING COMPUTER APPLICATIONS LAB
Prerequisite: MCS0093. Introduction to the use of computers as a tool for solving engineering problems. Use of spreadsheets, mathematical analysis programs, applied programming and other applications. Course content varies with the engineering discipline (civil, electrical, mechanical), so the student should enroll in the appropriate section. Lect. 1 hr., Lab. 2 hrs. 2 hours credit.

EGE2013 STATICS
Prerequisites: MCS2414, PHY2413. Vector Algebra; resultant of force systems; equilibrium force systems; equilibrium of particles, rigid bodies using free-body diagrams; friction; centroids; moments of inertia. Lect. 3 hrs. 3 hours credit.

EGE3003 THERMODYNAMICS
Prerequisites: MCS2414, PHY2413. Thermodynamic systems, the first law of thermodynamics, transient and steady flow processes, physical properties, the second law of thermodynamics, reversible and irreversible processes, the property entropy, vapor and gas power cycles. Lect. 3 hrs. 3 hours credit.

EGE3012 ENGINEERING COST ANALYSIS
Prerequisite: 0. Basic development of the cost consequences of engineering decision-making. Interest calculations, cash flow equivalences, annual cash flows, rates of return, incremental analysis and other analytical approaches. Depreciation, income taxes and replacement analysis. Lect. 2 hrs. 2 hours credit.

EME1011 MATERIALS LABORATORY
Prerequisites: EGE1023, COM2103. A project laboratory devoted to the study of metallographic techniques, heat treatment, structures of metals, alloys, ceramics, and plastics, and physical testing. Lab 2 hrs. 1 hour credit.

EME102 MECHANICAL ENGINEERING GRAPHICS
Prerequisite: 0. An integrated course in engineering graphics for all students in the College of Engineering. Introduction to graphics in design, fundamentals of orthogonal projection and experience in applying these principles to the solution of space problems. ACAD software. Lect. 1 hr., Lab. 2 hrs. 2 hours credit.

EME101 INTRODUCTION TO ENGINEERING PROJECTS
Prerequisite: Junior standing. Student needs a passing grade in EME4003 before enrolling in EME4212. Introduction to the design process, matching engineering specifications to customer requirements, prototyping, product testing and evaluation, project planning and management. Students will select senior projects, form project teams and submit a project pre-proposal. Orientation to fabrication facilities. Lab 2 hrs. 1 hour credit.

EME103 MECHANICS OF MATERIALS
Prerequisite: EGE2013. Stress as internal force intensity. Stress and deflections due to: axial, torsional, and bending loads; statically indeterminate loads and design of an efficient structure. Lect. 3 hrs. 3 hours credit.

EME1032 MANUFACTURING PROCESSES
Prerequisite: EGE1023. Relationship between product engineering and manufacturing engineering. Casting processes, bulk deformation processes, sheet metal processes, joining & welding processes, single-cutting-edge operations, multi-cutting-edge operations, random-cutting-edge operations, non-traditional machining, design for fabricability, the factory of the future. Lect. 3 hrs. 3 hours credit.

EME3024 FLUID MECHANICS
Prerequisites: EGE3003, EME3013, EME3043. Fluid statics; conservation of mass, momentum, and energy; dimensional analysis and similitude; pipe flow; laminar and turbulent boundary layers; lift and drag on immersed bodies, potential flow, compressible flow. Lect. 4 hrs. 4 hours credit.

EME3034 KINETICS & DYNAMICS OF MACHINES
Prerequisite: EME3043. Mechanisms; linkages, cams, gears and gear trains; displacement, velocity; acceleration, synthesis of mechanisms. Dynamic force analysis of machines including general linkage, cams, slider cranks, and space mechanisms. Syntheses of dynamically constrained components. Lect. 4 hrs. 4 hours credit.

EME3043 DYNAMICS
Prerequisites: EGE2013. Kinematics and kinetics of particles, rigid bodies, and systems of particles and rigid bodies will be analyzed by the classical methods; vibrations of single degree of freedom systems. Lect. 3 hrs. 3 hours credit.

EME4003 DESIGN OF MACHINE ELEMENTS
Prerequisite: EME3013. Student needs a passing grade in EME4003 before enrolling in EME4212. Application of the principles of solid mechanics and other engineering sciences to the efficient design of simple machine elements such as fasteners, gears, springs, and simple structures. Mechanical failure criteria and the effects of fatigue and impact loading on components are presented. Lect. 3 hrs. 3 hours credit.
EME4012 COMPUTER AIDED ENGINEERING
Prerequisites: Senior Standing, MCS2423. Introduction to the use of computers in solving engineering problems. Students will develop computer programs to implement numerical methods. Techniques discussed include solutions to linear systems of equations, eigenvalue problems, numerical integration and finite differences. Lect. 1 hr., Lab. 2 hrs. 2 hours credit.

EME4013 HEAT TRANSFER
Prerequisites: EGE3003; EME3024 recommended, but may be a co-requisite. Steady and transient conductive heat transfer; radiative heat transfer, forced and free convection heat transfer, psychrometrics. Design of heat exchangers. Lect. 3 hrs. 3 hours credit.

EME4103 ADVANCED MANUFACTURING PROCESSES

EME4113 THERMODYNAMICS II
Prerequisite: EGE3003. The concept of availability, refrigeration cycles, mixtures and psychrometrics, combustion and thermochemistry, chemical equilibrium, equations of state and thermodynamic relations. Lect. 3 hrs. 3 hours credit.

EME4123 AUTOMATED MANUFACTURING SYSTEMS
Prerequisite: EME3023. Overview of automated manufacturing systems, numerical control machines and programming, adaptive control, automated material handling, integrated flexible manufacturing systems. Lect. 3 hrs. 3 hours credit.

EME4133 MANUFACTURING FACILITIES DESIGN
Prerequisite: EME4123 and senior standing. Design of the manufacturing plant to use space, machines, material handling methods, and equipment for economical production and inspection. Lect. 3 hrs. 3 hours credit.

EME4143 WORLD CLASS MANUFACTURING
Prerequisite: EME3023. Excelling in world class manufacturing. Concurrent engineering, product development, quality engineering, automated inspection and testing, statistical process control, cellular manufacturing, manufacturing cost estimating, total productive maintenance, agile manufacturing, quality systems standards, and total quality. Lect. 3 hrs. 3 hours credit.

EME4153 ROBOTICS APPLICATION
Prerequisite: EME3023. Fundamentals of robot technology. Control systems and components, robot motion analysis and control, robot end effectors and sensors, machine vision, robot programming, robot languages, economic analysis, material handling, processing and assembly applications. Lect. 3 hrs. 3 hours credit.

EME4203 ADVANCED MECHANICS OF MATERIALS
Prerequisite: EME3013. Advanced topics in classical strength of materials and the analysis and design of mechanical components. Theories of failure, elasticity, thick-walled cylinders and rotating disks, plate bending, and thin shells. Lect. 3 hrs. 3 hours credit.

EME4212 ENGINEERING PROJECTS 1
Prerequisite: EME3011, EME4003. Initiation of the senior design project, formal engineering proposal, oral presentation, concept development, project documentation. Student project teams work closely with a faculty advisor. 2 hours credit.

EME4213 ADVANCED MATERIALS
Prerequisite: EGE1023. An advanced course in engineering materials, emphasizing the relationships between microstructures, processing, properties and design. Lect. 3 hrs. 3 hours credit.

EME4222 ENGINEERING PROJECTS 2
Prerequisite: EME4212. Completion of the senior project, formal final report, oral presentation, prototype development, fabrication, testing and evaluation. Student project teams work closely with a faculty advisor to meet project objectives. 2 hours credit.

EME4233 MECHANICAL VIBRATIONS
Prerequisite: EME3043. Harmonic oscillations of one and two degrees of freedom linear systems. Damped vibration. Concept of vibration isolation. Multi-degrees of freedom systems. Lect. 3 hrs. 3 hours credit.

EME4243 FINITE ELEMENT ANALYSIS
Prerequisite: EME3013. Introducing the theory and application of the FEA method to the stress analysis and design of mechanical systems. Matrix methods in structural analysis are used. Element and structural stiffness matrices are developed and used to solve for displacement, strains, and stresses in trusses, beams, and plane problems. Boundary conditions and modeling consideration. Introduction to general purpose FEA software. Lect. 2 hrs., Lab. 2 hrs. 3 hours credit.

EME4253 VEHICLE DYNAMICS
Prerequisites: EME3043. EME4233 is recommended. Fundamentals of vehicle dynamics with focus on acceleration, braking, ride and handling, steering, tire dynamics, and vehicle instability (e.g., rollover). Lect. 3 hrs. 3 hours credit.

EME4263 MICROMECHANICS OF MATERIALS
Prerequisites: EGE1023, EME3013. Mechanical behavior of materials, emphasizing the effects of microstructure on properties. Models for deformation, fracture, and fatigue. Analytical and predictive methods useful to the design engineer. Materials testing and proper use of materials property data. Lect. 3 hrs. 3 hours credit.

EME4273 DESIGN OF MACHINE ELEMENTS 2
Prerequisites: EME3023, EME3024, EME4003. A continuation of the study of design of mechanical systems and components. Principles of engineering mechanics and materials applied to the solution of design problems involving lubrication and bearings, power transfer devices, and brakes and clutches. Principles and applications of hydraulic power systems and design using polymers and composite materials. Lect. 3 hrs. 3 hours credit.

EME4313 FUNDAMENTALS OF QUALITY SYSTEMS
Prerequisite: Senior standing, EME3023, MCS3403. Considerations for developing and implementing effective quality systems. An overview of the fundamentals of statistical principles and analysis of process variability, sampling techniques, control
Undergraduate Catalog 2001-2003

Lect. 3 hrs.

Psychometrics, humidification, heating, cooling, fluid flow and pressure losses, and system design. Lect. 3 hrs. 3 hours credit.

EME4323 ADVANCED FLUID MECHANICS
Prerequisite: EME3024.
Compressible flow; shock waves; duct flow with friction and heat transfer; propulsion; turbomachinery; flow measurements; design project and review. Lect. 3 hrs. 3 hours credit.

EME4333 SAFETY ENGINEERING
Prerequisites: Senior standing. Introduction to the basic principles of safety, analytical approaches to address concerns in the design and operation of products, equipment, facilities, environmental concerns and human factors. Legal aspects of safety and government regulations emphasized. Lect. 3 hrs. 3 hours credit.

EME4353 INTERNAL COMBUSTION ENGINES
Prerequisite: EGE3003.
Methods of predicting engine performance; e.g., power, torque, efficiency and fuel consumption. Fuels, air and fuel induction systems, spark and valve timing and matching the engine to the vehicle. Experimental measurement procedures. Lect. 3 hrs. 3 hours credit.

EME4363 THERMAL FLUID SYSTEM DESIGN
Prerequisites: EGE3003, EME3024, EME4013. Students work individually or in small groups to design systems and/or devices. Piping systems, heat exchangers, prime movers, system simulation and fluid transients. Lect. 3 hrs. 3 hours credit.

EME4373 AUTOMOTIVE HEATING, VENTILATING AND AIR CONDITIONING
Prerequisite: EME4013 or graduate standing. Introduction to the design and analysis of heating, ventilating and air conditioning systems with an emphasis on automotive applications.

EME4402 MECHANICS LABORATORY
Prerequisite: EME3013, EME3043. Illustrates the principles of mechanics (dynamics, mechanics of materials) and introduces the tools and techniques of experimental mechanics. Lect. 1 hr., Lab. 2 hrs. 2 hours credit.

EME4412 THERMAL SCIENCE LABORATORY
Prerequisites: EME3024, EME4013. "The study of heat transfer, fluid flow, thermodynamics, mechanical dynamics, data acquisition, and control. Experiments illustrate each topic and reports are written for each experiment. Lect. 1 hr., Lab. 2 hrs. 2 hours credit.

EME4603 INTRODUCTION TO MECHANICS (Non-ME)
Prerequisites: EGE2013, not open to Mechanical Engineering majors. Exposes non-mechanical engineering students to the principles of engineering mechanics. Dynamics, strength of materials, gears, and vibrations. Lect. 3 hrs. 3 hours credit.

EME4613 INTRODUCTION TO THERMAL SYSTEMS (Non-ME)
Prerequisites: MSC2413, PHY2413, not open to Mechanical Engineering majors. The principles of engineering thermodynamics, fluid mechanics, and heat transfer. Conservation of mass and energy, brief topical coverage of the second law of thermodynamics, thermodynamic cycles, hydraulics, flow losses, coefficients of drag, and heat exchanges. Lect. 3 hrs. 3 hours credit.

EME4981 - EME4983 SPECIAL TOPICS IN MECHANICAL ENGINEERING
Prerequisite: Dependent on topic. Hours of credit designated by last digit in course number. Covers a new or specialized topic in mechanical engineering for which there is strong faculty and student interest, but is not covered in other courses.

EME4991 - EME4993 DIRECTED STUDY IN MECHANICAL ENGINEERING
Prerequisite: Senior standing; consent of department chairman. Hours of credit designated by last digit in course number. In-depth study of a particular mechanical engineering topic. An approval form, outlining the proposed study, must be submitted and approved prior to election of course.

EME5103 FASTENERS AND BOLTED JOINTS
Prerequisite: EME4003. Introduction to the analysis, behavior and design of fasteners and bolted joints for static and cyclic loading. Assembly and in service issues and parameters as well as the reliability of bolted assemblies. Lect. 3 hrs. 3 hours credit.

EME5113 POLYMER MATERIALS AND PROCESSES
Prerequisite: EGE1023 or graduate standing. Classical, modern mathematical, and artificial intelligence methodologies. Lect. 3 hrs. 3 hours credit.

EME5243 FINITE ELEMENT ANALYSIS II
Prerequisite: EME4243. A second course in FEA that introduces higher order elements and focuses on using existing software packages to do class projects. Linear strain triangular, axisymmetric solid elements. Isoparametric formulation, dynamic analysis. Lect. 2 hrs., Lab 2 hrs. 3 hours credit.

COOPERATIVE EDUCATION IN ENGINEERING

ECO3001 CO-OP PRACTICUM I
Prerequisites: Junior standing (60 credit hours), 2.25 LTU GPA, completion of all freshman and sophomore course requirements, departmental approval. First full-time work assignment providing engineering experience in the workplace. Cannot be used for design credit without department chair approval. 1 hour credit.

ECO3101 CO-OP PRACTICUM II
Prerequisites: Satisfactory completion of ECO3001, departmental approval. Second full-time work assignment providing engineering experience in the workplace. Cannot be used for design credit without department chair approval. 1 hour credit.

ECO4001 CO-OP PRACTICUM III
Prerequisites: Satisfactory completion of ECO3101, departmental approval. Third full-time work assignment providing engineering experience in the workplace. Cannot be used for design credit without department chair approval. 1 hour credit.
Prerequisite: GCM1011. CHEMISTRY I-II

GCC1011-1021 BASIC CHEMISTRY

Prerequisites: GCM1011, GCM1021. The scope of chemistry, chemical reaction/measurement, mass, weight and density, temperature, periodic table, and Factor-Label Method. Includes solutions, acid and base chemistry, redox reactions, energy/enthalpy and Hess’ Law. 2 one-credit courses taken in succession.

GCC2011-2021 CHEMISTRY/MATERIAL SCIENCE I-II


GCE2411-2421 MANUFACTURING PLANNING I-II

Prerequisite: GCF1021. An introduction into manufacturing economics, basic concepts of direct and indirect costs, and time value of money. Material requirements planning, basic dynamics of material requirements planning, the basic lot sizing techniques used in MRP, and the difference between MRP and other release control techniques such as Kanban. 2 one-credit courses taken in succession.

GCE2461-2471 ENGINEERING ECONOMICS I-II

Prerequisite: 0. The fundamental and advanced concepts of engineering and economic evaluation of singular or pair-wise manufacturing engineering projects. Economic evaluation of multiple and mutually exclusive projects in manufacturing engineering, and the economic evaluation of multiple and independent projects in manufacturing operation. 2 one-credit courses to be taken in succession.

GCF1011-1031 INTRODUCTION TO COMPUTERS IN ENGINEERING I-II

Prerequisite: GCM1021. Computer basics, operating systems, introduction to computer hardware, word processing, spreadsheets, and Visual Basic. 3 one-credit courses taken in succession.

GCF1133 INTRODUCTION TO DESIGN GRAPHICS

Prerequisites: GCF1011, GCF1031. An introduction into the computer processes used in the design graphics field and the coupling needed between design and manufacturing. Visualization, generation of design geometry using 3-dimensional solids as the geometry primitives, control and utilization of design geometry, the design-graphics process, and the CAD to CAM process including data base type of tracking and validation of processes, including process planning, materials, features, etc. 3 credit hours

GCL1011-1031 FUNDAMENTALS OF ENGLISH COMPOSITION: ESSAYS AND VISUALS

Prerequisite: MTI. The writing process, report writing, memos, letters and editing reports. Applying strategies for locating information using library and computer sources to design and write a research report. Writing essays and designing visuals. 3 one-credit courses taken in succession.

GCL1211-1241 PSYCHOLOGY WITH SOCIOLOGY I-IV

Prerequisites: GCO0990, GCL1021. Methods, learning and memory; physiological and sensory psychology; human growth, development, and personality; and social psychology and sociology. 4 one-credit courses taken in succession.

GCL2011-2031 COMMUNICATIONS IN MANUFACTURING I-III

Prerequisites: GCL1011, GCL1021. An introduction into traditional and non-traditional media presentations and an introduction into design-graphics process, report writing, memos, letters and editing reports. 3 one-credit courses taken in succession.

GCM1011-1051 TECHNICAL MATH I-V

Prerequisite: MTI. Methods of solving quadratic equations, definition of functions, system of two and three linear equations, logarithms and exponents, lines and conics, trigonometric functions and trigonometric relationships; vector algebra. 5 one-credit courses taken in succession.

GCM2111-2141 CALCULUS I-IV

Prerequisite: GCM1051. Differential calculus; limits, derivatives, and derivative rules. Applications of the derivatives and properties of curves. The integral and numerical integration and calculus of transcendental functions. 4 one-credit courses taken in succession.

GCM2412,2431 MANUFACTURING STATISTICAL METHODS I-II

Prerequisites: GCM1011-1041. Multimedia instruction in the use of statistical methods in manufacturing. Problem-solving tools, descriptive statistics, data collections, control charts, process capability and tolerancing systems. Statistical computer packages are used and field studies are required. 1 two-credit and 1 one-credit course taken in succession.

GCS2111-2131 MECHANOPHYSICS I-III

Prerequisite: GCM1051. An introduction to basic physics concepts related to the study of motion and forces, and static equilibrium. Translation and rotation of a rigid body, rigid body rotation, coriolis effect, vectors and motion, velocity and mechanisms, and acceleration and mechanisms. 3 one-credit courses taken in succession.
GCS2141 INTRODUCTION TO ENGINEERING MECHANICS
Prerequisite: GCS2131.
Introduction to vibrations of mechanical systems and to the basic concepts of engineering structural analysis. 1 credit hour

GCS2211 THERMOSCIENCE
Prerequisites: GCM1041, GCM2131. Introduction to the properties and laws associated with thermodynamics, fluid mechanics, and heat transfer. Fluid density, pressure, and viscosity; fluids at rest (including Pascal’s and Archimedes’ principles); conservation of mass; Bernoulli equation; temperature scales; thermal expansion of liquids and solids; specific heats and heats of transformation; the first law of thermodynamics; kinetic theory of gases; and the second law of thermodynamics. 1 credit hour

GCT1111-2221 ELECTRICAL MACHINES I-II
Prerequisite: GCS2321.
Introduction to the theoretical and practical knowledge to achieve an understanding of the analysis of DC/AC circuits, industrial electric power specifications, industrial transformers, industrial and special purpose electric machines, and industrial solid state motor controllers and devices. 2 one-credit courses taken in succession.

GCT2111-2121 TOOL DESIGN I-II
Prerequisites: GCM1021, GCF1121, GCT1121, GCT2021.
Tool design methods, tool-work interaction, tool materials and work holding principles, design of drill jigs, design of fixtures, and tool design guide. 2 one-credit courses taken in succession.

GCT2211-2221 ELECTRICAL MACHINES I-II
Prerequisite: GCS2321.
Introduction to the theoretical and practical knowledge to achieve an understanding of the analysis of DC/AC circuits, industrial electric power specifications, industrial transformers, industrial and special purpose electric machines, and industrial solid state motor controllers and devices. 2 one-credit courses taken in succession.

GCT2511 DESIGN PROJECT
Prerequisite: 50 credits and 2 job rotations. A design project incorporating fundamentals learned in previous courses. The design process is emphasized from the establishment of objectives and analysis of alternative solutions to a final evaluation and recommendation. Final written and oral report required, and use of manufacturing facility in production of design is encouraged. 1 credit hour

GCT2181-2191 TOOL DESIGN I-II
Prerequisites: GCM1021, GCT1121, GCT2021.
Tool design methods, tool-work interaction, tool materials and work holding principles, design of drill jigs, design of fixtures, and tool design guide. 2 one-credit courses taken in succession.

GCT2313, 2341 MANUFACTURING SYSTEMS I-II
Prerequisite: 0.
Introduction to manufacturing systems design. Fundamentals of manufacturing systems design, graphical analysis tools, mathematical analysis tools, and data communications networks. 1 three-credit and 1 one-credit course taken in succession.

GCT2451-2461 ETHICS AND INDUSTRY I-II
Prerequisite: 0.
To be developed. 2 one-credit courses taken in succession.

GCT2451-2461 ETHICS AND INDUSTRY I-II
Prerequisite: 0.
To be developed. 2 one-credit courses taken in succession.
Dean:
Louis A. DeGennaro, M331, (248) 204-3055

Coordinator of Bachelor of Science in Information Technology:
Elizabeth Jenaway, M331, (248) 204-3050

Professors:
Louis A. DeGennaro
Vernon R. Hoffner
Leland A. Lahr, emeritus

Associate Professors:
Barbara A. Kouskoulas
Srikant Raghavan
Jacqueline M. Stavros

College Professors:
Andrew S. Borchers
Patricia Castelli

Senior Lecturer:
Loran Walker

Adjunct Faculty:
Additional guest lecturers are assigned to selected courses and sections based on their particular specialties and expertise, and are listed in the faculty roster.

Faculty Council:
Barbara A. Kouskoulas, council chair
Andrew S. Borchers
Patricia Castelli
Vernon R. Hoffner
Srikant Raghavan

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global sales manager,
Borg-Warner Automotive, Inc.

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

The B.S.I.T. (Bachelor of Science in information technology) degree and certificate program are designed with four goals in mind:

1. Provide students with the theoretical concepts necessary for success in industry.
2. Give students hands-on experience using current technologies.
3. Provide students with an employable skill set.
4. Provide industry with highly trained and competent IT professionals.

Students in the B.S.I.T. program experience coursework in Database Design, Systems Analysis, Technical Infrastructure, Project Management, Information Systems Management, Telecommunications and
various business courses. To enhance the learning experience, class sizes are limited, courses meet once a week and students explore various information technology topics through a course’s Internet component.

As students approach their senior year, they select a concentration in systems design, infrastructure or software applications. The purpose of this concentration is to allow students the opportunity to apply the theory they have learned in their coursework with current technologies available in the work place. Students, therefore, acquire a valuable skill set that can be applied to their first day on the job.

The B.S.I.T. degree and certificate program combine fundamental business concepts with current technology. This allows students to solve complex business problems using the technology they have learned. Students can develop careers in systems analysis design, Web development, network administration, Web administration, systems programming and applications support. More importantly, the B.S.I.T. merges two ideologies that are at the heart of learning at Lawrence Tech: theory and practice. This has been proven to be the competitive edge most students seek when they embark upon their careers.

COLLEGE OF MANAGEMENT - GRADUATE PROGRAMS

The College of Management offers graduate programs in the following areas:

Career Integrated Master of Business Administration
Master of Business Administration
Master of Science in Industrial Operations
Weekend Master of Science in Industrial Operations
Master of Science in Information Systems

OTHER MANAGEMENT RELATED UNDERGRADUATE DEGREES

For information on the following undergraduate management-related degrees:

Bachelor of Administration: see the College of Arts & Sciences, Department of Humanities, Social Sciences and Communication
Bachelor of Science in Industrial Management: see the College of Engineering, Department of Engineering Technology
Bachelor of Science in Technology Management: see the College of Engineering, Department of Engineering Technology

For further information on these programs, see the Graduate Catalog.
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (B.S.I.T.)

Total Semester credit hours: 125

MATHEMATICS AND SCIENCE (18 CREDIT HOURS)
- MCS1214 Introduction to Math Analysis 1
- MCS1224 Introduction to Math Analysis 2
- MCS2113 Statistics
- PSC1113 Physical Science 1
- PSC1123 Physical Science 2
- PSC1131 Physical Science Lab

ENGLISH/COMMUNICATIONS (10 CREDIT HOURS)
- COM1001 University Seminar
- COM1103 English Composition
- COM2103 Technical and Professional Communications
- COM3103 Adv Professional Communications

HUMANITIES/SOCIAL SCIENCES (18 CREDIT HOURS)
- LLT1213 World Masterpieces 1
- LLT1223 World Masterpieces 2
- SSC2413 Found American Experience
- SSC2423 Devel American Experience
- SSC2313 Macroeconomics

COMPUTING (5 CREDIT HOURS)
- INT1001 (taken 3 times) or MCS1003 Intro to Computer Appl
- MCS1142 Intro to C Programming

PROFESSIONAL MINOR (BUSINESS OR ANOTHER MINOR APPROVED BY THE DIRECTOR)
- ACC2013 Accounting Principles
- HRM3013 Organizational Behavior
- FIN3103 Intro to Finance Management
- MKT3013 Principles of Marketing
- MGT2203 Management and Supervision
- OPM3113 Operations Management

INFORMATION TECHNOLOGY CORE (41 CREDIT HOURS)
- INT3023 Information Technology Inaugural
- INT3053 PC Personal Productivity with IS Technology
- INT3103 Information Technology Management
- INT3203 Technical Infrastructure
- INT4013 Telecommunications and Networks
- INT4203 Systems Analysis
- INT4303 Physical Design and Implement with Program Environ
- MCS1514 Computer Science 1
- MCS2514 Computer Science 2
- MCS3543 Introduction to Database Systems
- TIE2123 Project Management

FOCUSED ELECTIVES (6 HOURS OF 3000 LEVEL OR ABOVE COMPUTER SCIENCE OR INFORMATION SYSTEMS COURSEWORK)
- Students can, with permission, take graduate information systems (MISXXXX) courses including those from the new database technology and e-commerce tracks to meet this requirement.

GENERAL ELECTIVES (3-6 CREDIT HOURS)
- LTU Undergraduate courses (especially MCS) or LTU Graduate courses with permission

CONCENTRATION (12 CREDIT HOURS)
- Students will select one of the following areas of study: infrastructure, systems development or software applications. They will develop a plan of study with a full time faculty member that may include formal coursework, industry training or directed study. Credit will be awarded on an evaluated or non-evaluated basis as follows.

Evaluated: Students that complete formal coursework or training which includes formal examinations, will earn transfer credit for INT4503 Professional Certification and Training (course is taken four times for a total of 12 credits).

Non-Evaluated: Students that complete training and directed study that does not include formal examination will earn credit in the following courses: INT4505 Professional Training (course is taken twice for a total of 10 credit hours) and INT4992 Portfolio Project (2 credit hours).

CERTIFICATE IN INFORMATION TECHNOLOGY
Admission: The certificate program is intended for mid-career students, not those immediately out of high school. Hence, admission is limited to students who:
1. have completed one year of college work at a regionally accredited college or university with a GPA of at least 2.00 or
2. have three years of post high school work experience and either clear LTU placement exams in math and English or complete remedial courses.

PREREQUISITE COURSES (FULFILLED WITH COURSEWORK OR RELEVANT EXPERIENCE)
- PC Literacy - INT1001 (taken 3 times) or MCS1003 Intro to Comp Appl
- MCS1142 C Programming

TECHNICAL CORE (25 CREDIT HOURS)
- INT3023 Information Technology Inaugural
- INT4013 Telecommunications and Networks
- INT4203 Systems Analysis
- MCS1514 Computer Science 1
- MCS3543 Database Management
- Plus any three of the following courses:
  - INT3053 PC Personal Productivity with IS Technology
  - INT3103 Information Technology Management
  - INT3203 Technical Infrastructure
  - INT4303 Physical Design and Implementation with Program Environ
  - MCS2514 Computer Science 2
  - MCS4623 Software Engineering
  - TIE2123 Project Management

Any 3000 level (or above) Computer Science Course (MCSXXXX)
Any graduate Information Systems Course (MISXXXX), with permission
INT1001 BASIC COMPUTER INSTRUCTION
Prerequisite: 0. Introduction to basic computer skills using vendor provided training material, offered through LTU’s Continuing Education and Professional Development division. Topics vary, but may cover operating systems, applications software, and Internet related topics. Coursework is American Council on Education (ACE) or LTU faculty approved. Students may earn no more than 6 hours of INT1001 and INT1002. Lect. 1 hr. 1 hour credit

INT1002 INTERMEDIATE COMPUTER INSTRUCTION
Prerequisite: 0. Computer skills training using vendor provided training material offered through LTU’s Continuing Education and Professional Development division. Topics vary, but may cover operating systems, applications software, and Internet related topics. Coursework is American Council on Education (ACE) or LTU faculty approved. Students may earn no more than 6 hours of INT1001 and INT1002. Lect. 2 hrs. 2 hours credit

INT3001 CO-OP PRACTICUM I
Prerequisite: Junior standing (60 credit hours), 2.25 LTU GPA, completion of all freshmen and sophomore course requirements, departmental approval. First full time work assignment providing information technology experience in the workplace. 1 hour credit

INT3002 INFORMATION TECHNOLOGY INAGURAL
Prerequisite: MCS1003. Introduction to how information is used in organizations and how information technology enables improvement in quality, timeliness and competitive advantage. Systems and development concepts, information technology issues, as well as hardware and software consideration. Lect. 3 hrs. 3 hours credit

INT3053 PERSONAL PRODUCTIVITY WITH INFORMATION SYSTEMS TECHNOLOGY
Prerequisite: MCS1003. Improving skills as knowledge workers through effective and efficient use of packaged software. Focus on using the computer to increase productivity. Small systems design and development issues. Coursework is completed both on individual and group basis. Lect. 3 hrs. 3 hours credit

INT3101 CO-OP PRACTICUM II
Prerequisite: Satisfactory completion of INT3001, departmental approval. Second full time work assignment providing information systems experience in the workplace. 1 hour credit

INT3103 INFORMATION TECHNOLOGY MANAGEMENT
Prerequisite: INT3023. How information is used and managed within organizations. The use of information as a resource, developing and managing information systems, IS planning and implementation, reengineering, end-user computing, information systems strategies, network and telecommunications systems management, electronic commerce and societal and ethical issues relating to information systems design and use. Lect. 3 hrs. 3 hours credit

INT3203 TECHNICAL INFRASTRUCTURE
Prerequisite: INT3023. Designing a computer architecture that will meet the needs of the business environment. Current hardware, network and software technologies will be explored as well as system architectures for the single user, center, and networked computing systems. Single and multi-user operating systems will also be discussed. Lect. 3 hrs. 3 hours credit

INT4001 CO-OP PRACTICUM III
Prerequisite: Satisfactory completion of INT3101, departmental approval. Third full time work assignment providing information systems experience in the workplace. 1 hour credit

INT4013 TELECOMMUNICATIONS AND NETWORKS
Prerequisite: INT3023. In-depth knowledge of data communications and networking. Telecommunications technologies, hardware and software. Special emphasis on the design, implementation and management of local area networks and wide area networks. Network privacy, security and reliability. Lect. 3 hrs. 3 hours credit

INT4503 PROFESSIONAL CERTIFICATION AND TRAINING
Prerequisite: Approval of full time faculty member and undergraduate program director. With approval of a faculty member, students complete advanced technical training in an IT related field and successfully pass a certification exam. All training must be American Council on Education (ACE) or LTU faculty approved. Programs include: MSCE, CNE, CCIE, Oracle Database or Unix system administrator. Lect. 3 hrs. 3 hours credit

INT4506 and INT4524 PROFESSIONAL TRAINING - NON EVALUATED
Prerequisite: Approval of qualified full time faculty member and undergraduate program director. Students develop an individual plan of study with a faculty mentor that may include industry seminars, formal coursework and self-study. Students complete a portfolio project, INT4992.

INT4992 PORTFOLIO PROJECT
Prerequisite: Approval of qualified full time faculty member and undergraduate program director. A project is completed that demonstrates the various skills gained while completing a concentration. Students work closely with a faculty advisor during development of this project. 2 hours credit
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Blue Cross/Blue Shield of Michigan

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President and Chief Executive Officer,
Lawrence Technological University

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Senior Vice Chairman, National Bank of Detroit and
NBD Bancorp (ret.)

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Former Chairman, Air Products and Chemicals, Inc.

Esther G. Edwards
President/Director, Motown Historical Museum, Inc.

Alfred E. Entenman, Jr., P.E.,
Executive Consultant, B.E.I. Associates, Inc.

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Executive Vice President, Ford Motor Company (ret.)

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Chairman of the Board, Barton-Malow Company

Julius L. Pallone
President, J.L. Pallone Associates

Kurt O. Tech, ME’48
Management Consultant; President, The Cross Company (ret.)

Sydney L. Terry
Consultant to Business, Government, Industry;
Vice President, Public Responsibility and Consumer Affairs,
DaimlerChrysler Corp. (ret.)
ADMINISTRATION

February 1, 2001

ADMINISTRATION

President and Chief Executive Officer...Charles M. Chambers
Executive Assistant to the President.........Louise M. Garrett
University Architect..............................Joseph C. Verryser
Special Assistant for Pacific Programs...............George Shen
Special Assistant for European Programs......George Schneider
Special Assistant for Canadian Programs.........Jacob Lai
Special Assistant for Near Asia Programs.....Satya Nallamothu

Vice President, University Advancement......Stephen C. Ragan
Director, Major Gifts..............................Dennis J. Howie
Director, Alumni Relations and
Annual Giving.....................................Dino M. Hernandez
Director, Corporate and Foundation
Development........................................Edith H. Assaff
Manager, Community Relations and
Special Events.....................................Ann Cleary
Manager, Advancement Services...............Chris R. Sanders
Executive Director, Marketing and
Public Affairs.......................................Bruce J. Annett, Jr.
Manager, University Communications
and Academic Editor............................Jane Rothschild Ellis
Managing Editor, News Bureau.................Karen M. Sanborn
Director, Multimedia Services and
University Photographer........................Walter G. Bizon
Coordinator, Media Production .............Henry J. Dryovage

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and Chief Fiscal Officer.......................J. Lee Johnson
Director, Business Services.......................Judith S. Milosic
Director, Financial Aid and
Veterans Affairs..................................Mark A. Martin
Manager, Human Resources......................Deshawn Warrick-Johnson
Manager, University Housing Center*........Laura Affer
Lead Security Officer..............................Jay Monroe
Director, Campus Facilities......................Carey G. Valentine
Manager, Contract Dining Service.............Brent Bishop
Manager, University Bookstore...............Carl Campanella

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Associate Provost and Dean of
Graduate Programs...............................Maria J. Vaz
Coordinator, Institutional Research
and Academic Planning..........................Mary E. Thomas
Coordinator of International Students,
Director of ESL Programs.......................Fay Patel

Chief Technology Officer....................Laird E. Johnston
Director, Lewis Veraldi Center for Educational
Technology & Chief Information Officer...Thomas A. Lackey
Director, Edward Donley Computer Center....John S. Grden

ADMINISTRATION OF THE COLLEGES

Dean of Architecture and Design...............Neville H. Clouten
Associate Dean of Architecture
and Design.......................................Betty-Lee Seydler-Hepworth
Chair, Architecture...............................David L. Chasco
Chair, Art and Design.............................Virginia North

Dean of Arts and Sciences........................James S. Rodgers
Associate Dean of Arts and Sciences.........Glen A. Bauer
Chair, Humanities, Social Sciences,
and Communication............................Gonzalo Munevar
Chair, Mathematics and
Computer Science...............................David E. Bindschadler
Chair, Natural Sciences........................William G. Madden

Dean of Engineering............................Laird E. Johnston
Associate Dean of Engineering..............Richard S. Maslowski
Assistant Dean of Engineering and
Chair, Civil Engineering.........................Alan L. Prasuhn
Chair, Electrical and Computer Engineering*...Ronald C. Foster
Chair, Engineering Technology...............William L. White
Chair, Mechanical Engineering..................Steven K. Howell

Dean of Management............................Louis A. DeGennaro
Director, Executive Management Program.....Laura Majewski
Director, International Management
Program............................................Chin-Ling Lin
Director, Information Technology............Jacqueline M. Stavros

ACADEMIC SERVICES

Dean of Students*.................................Jerry L. Crist
Coordinator, Academic Achievement
Center.............................................Diana Richard
Director, Career Services*.....................Jessica F. Miller
Coordinator, Cooperative Education........Jessica F. Miller
Director, Student Services......................Alan McLaughlin
Director of Admissions........................Lisa Kujawa
Assistant Director of Admissions...............Jane T. Rohrback
Advisor, International Student Affairs....Frank E. P. deHesselle
Registrar........................................Ann M. Liska
Director, Library................................Gary R. Cocozzoli
Director, Continuing Education and
Professional Development.....................Mary Ann Marcum
Coordinator, Insurance Studies...............Harriette A. Sheppard

* Interim Appointment
ACADEMIC COMMITTEES

February 1, 2001

FACULTY COMMITTEES

Academic Computer Advisory
Thomas A. Lackey*
Neville H. Clouten
John S. Grden (advisor)
Vernon R. Hoffner
Pamela Lowry
Danny Price
James S. Rodgers

Academic Program Assessment
Barry W. Knister*
Ruth G. Favro
Nancy S. Fearon
Richard S. Maslowski
Srikant Raghavan

Academic Standing
David M. Chasco
Harold Hotelling
Mark A. Martin
Richard S. Maslowski

Additional Credit Review
Ann M. Liska (ex-officio)*
Mark A. Martin
Richard S. Maslowski
Maria J. Vaz
Glen A. Bauer

Campus Learning Environment Committee
Neville H. C. Clouten*
William S. Allen
Howard Deardorff
Robert F. Fearon
Gary J. Grobson
John D. Hilberry
James S. Rodgers
Philip L. Vogt
Betty-Lee Seydler-Hepworth
AIS Student Representative
Lewis N. Walker (ex-officio)

Faculty Handbook
Stanley F. Harris*
Donald F. Condit
Lewis G. Frasch
Sonia Henckel
Richard R. Johnston
Zaven Margosian
Gretchen Maricak
Danny Price
Srikant Raghavan

Financial Aid and Scholarships
Jerry L. Crist*
Donald F. Condit
Nancy S. Fearon
Mark A. Martin
Richard S. Maslowski

Graduate Council
William S. Allen
William C. Arlinghaus*
Badih Jawad
Barbara A. Koukoulas
Dean of Graduate Programs
(ex-officio)

Library
Gary R. Cocozzoli*
Richard Johnston
Barbara A. Koukoulas

Student Activities
Alan McLaughlin*
Bruce J. Annett, Jr.
Thomas A. Lackey
Student Government President

Student Discipline
Aydan Ilter
Laura L. Lisiecki
Pamela Lowry
*Chairperson
February 1, 2001

COLLEGES OF ARCHITECTURE
AND DESIGN, ARTS AND
SCIENCES, ENGINEERING, AND
MANAGEMENT

The two years at the end of each listing indicate first the year of initial appointment to the University faculty, and second, the year of appointment to the designated rank. The current professional engagements of guest lecturers is also shown. Current names of degree-granting institutions are used.


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FACULTY ROSTER


JOONGSUB KIM, RA; AICP; B.Arch., 1979, Hong-Ik University, Seoul, Korea. M.Arch., 1984, University of Nebraska, M. City Planning and M.S.Arch., 1987, Massachusetts Institute of Technology. Assistant Professor of Architecture, 2000, 2000.


SRIKANT RAGHAVAN, B.S., 1969, University of Madras; M.S., 1971, University of Delhi; M.S., 1972, Case Western Reserve University; Ph.D., 1978, University of Houston. Associate Professor of Management, 1987, 1992.


MARILYN V. RANDS, B.S., 1959, Indiana State University; M.S., 1964, Michigan State University. Associate Professor of Physics, 1976, 1994.


**FACULTY ROSTER**

**RICHARD M. SRODAWA, PE;**

**RHODA B. STAMELL, B.A.,**

**CORINNE B. STAVISH, B.A.,**

**THOMAS E. STECHOW, B.S.,**

**SHARI STEIN, IIDA, B.F.A.,**

**MARVIN STERN, A.B.,**

**FLUMO Y. STEVENS, B.S.,**

**MONICA E. STEVENS, B.A.,**

**ROBIN STEVENSON, B.S.C.,**

**JOHN STOCK, B.S.,**

**PAULA STOFER, B.S.,**
1979, Lawrence Technological University; M.A., 1981, Oakland University; Ph.D., 1997, Michigan State University. Assistant Professor of Humanities, 1979, 1979.

**BETTY STOVER, B.S.,**

**ROY J. STRICKFADEN, RA;**


**BENJAMIN SWEET, B.S.E.E.,**

**KHALIL S. TARAMAN, PE;**

**SALLY TARDELLA, B.A.;**

**LAMI TAWEEL, B.S.C.E.,**

**RICHARD C. TENNEY, B.S.E.E.,**

**KEITH TIMBRE, B.S.,**

**BENEDETTO TISEO, AIA;**

**JOHN TOCCO, B.S.C.E.,**

**MICHAEI TOMASIK, AIA;**

**VAHAN H. TOOTIKIAN, B.A.,**

**WILLIAM L. TOTH, B.S.,**

**NICHOLE M. VILLENEUVE, B.S.E.E.;**
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IMPORTANT NOTES
I’d like to learn more about Lawrence Technological University. Please send me:

- Admissions Catalog and Application for Admission
- Scholarship/Financial Aid Info

I’M INTERESTED IN:

- Day programs
- Evening programs
- Semester beginning _________________

CERTIFICATE PROGRAM IN _________________

4-YR BACHELOR DEGREES

- Administration
- Architectural Imaging
- Architecture
- Chemistry
- Civil Engineering
- Computer Engineering
- Computer Science
- Construction Management
- Electrical Engineering
- Engineering Technology
- Environmental Chemistry
- Humanities
- Industrial Management
- Information Technology
- Interior Architecture/Design

- Mathematics
- Math/Computer Science
- Mechanical Engineering
- Physics
- Physics and Computer Science
- Technical Communication
- Technology Management

2-YR ASSOCIATE OF SCIENCE DEGREES

- Chemical Technology
- Construction Engineering Technology
- Electrical Engineering Technology
- Manufacturing Engineering Technology
- Mechanical Engineering Technology
- University Studies

GRADUATE DEGREES

- Master of Architecture
- Master of Architecture post professional degree
- Master of Automotive Engineering
- Master of Business Administration
- Master of Civil Engineering
- Certificate in Manufacturing Systems
- Master of Engineering/Manufacturing Systems
- Master of Science in Computer Science
- Master of Science in Education
- Master of Science in Industrial Operations
- Master of Science in Information Systems

Name (in full) ___________________________________________  ☐ Female  ☐ Male

Address _________________________________________________________________________

City _________________________________________________ State ________ Zip __________

E-Mail address ____________________________________________

Home Phone (____)_____________________  Business Phone (____)_______________________

High School (or College) ____________________________________________________________

Month and year of H.S. graduation ___________________Grade Average ________ ACT _______

MAIL TO
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Office of Admissions
21000 West Ten Mile Road
Southfield, MI  48075-1058

Or fax at (248) 204-3188