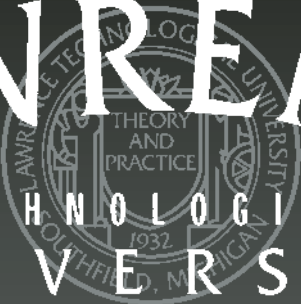


LAWRENCE

TECHNOLOGICAL
UNIVERSITY

The seal of Lawrence Technological University is circular and features the text 'LAWRENCE TECHNOLOGICAL UNIVERSITY' around the perimeter. In the center, it reads 'THEORY AND PRACTICE' and '1932'. The seal is partially obscured by the large 'LAWRENCE' text above it.

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

A black and white photograph of a modern university campus. In the foreground, several students are walking on a paved plaza. In the background, there is a large, multi-story building with a prominent cylindrical tower. Bare trees are scattered throughout the scene.

UNDERGRADUATE
CATALOG
2001-2003

UNDERGRADUATE CATALOG 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

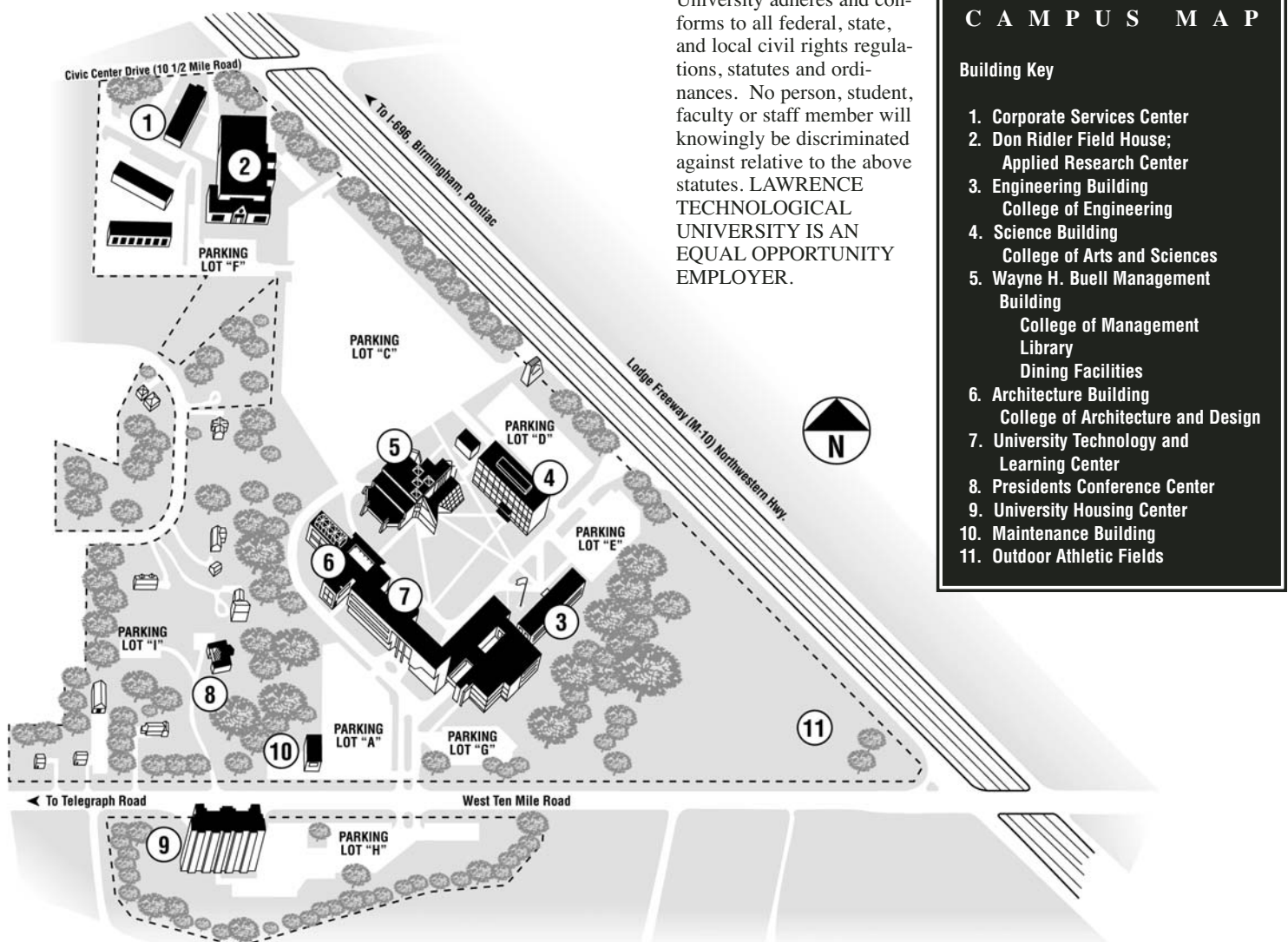
This *Undergraduate Catalog* is a compendium of learning opportunities available at Lawrence Technological University. It includes information on academic programs, requirements for admission and graduation, rules, regulations, and expectations. Failure to read this *Undergraduate Catalog* does not excuse 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 to 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.



UNDERGRADUATE CATALOG 2001-2003

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Lawrence Tech in brief	Back Cover

ACADEMIC SCHEDULE 2002-2003

Fall Semester 2002

April 8-12 Advance registration
 April 14-August 28 STUREG continues
 August 27 Last day to register without a late fee
 August 28 **Classes begin;** late registration
 August 31 Last day of classes before Labor Day recess
 September 3 Classes resume
 November 20 Last day to withdraw
 November 27 . Last day of classes before Thanksgiving recess
 December 2 Classes resume
 December 14 Last day of classes before final exams
 December 16-19 Final exams
 December 20 Fall semester ends

Spring Semester 2003

November 4-8 Advance registration
 November 8-January 13 STUREG continues
 January 10 Last day to register without a late fee
 January 13 **Classes begin;** late registration
 January 13* Martin Luther King Day celebration
 March 8 Last day of classes before mid-semester break
 March 10-15 Mid-semester break
 March 17 Classes resume
 April 11 Last day to withdraw
 May 3 Last day of classes before final exams
 May 5-8 Final exams
 May 18 Graduation
 May 19 Spring semester ends

Summer Semester 2003

Session A:

April 7-11 Advance registration
 April 14-May 14 STUREG continues
 May 13 Last day to register without a late fee
 May 14 **Classes begin;** late registration
 May 24 Last day of classes before Memorial Day recess
 May 27 Classes resume
 June 11 Last day to withdraw
 June 25 Semester ends

Session B:

April 7-11 Advance registration
 April 14-July 3 STUREG continues
 July 3 Last day to register without a late fee
 July 7 **Classes begin;** late registration
 August 8 Last day to withdraw
 August 18 Semester ends

Session E:

April 7-11 Advance registration
 April 14-May 14 STUREG continues
 May 13 Last day to register without a late fee
 May 14 **Classes begin;** late registration
 May 24 Last day of classes before Memorial Day recess
 May 27 Classes resume
 July 3 ... Last day of classes before Independence Day recess
 July 7 Classes resume
 July 9 Last day to withdraw
 July 24 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.

FOR YOUR COMPETITIVE EDGE



KING PHOTO

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

FOR YOUR COMPETITIVE EDGE

“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



ANNETT PHOTO

FOR YOUR COMPETITIVE EDGE

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



SMITH PHOTO

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 upperclassmen, 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 suc-

cessful 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.

FOR YOUR COMPETITIVE EDGE

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.



SAUNDERS PHOTO

YOUR CAMPUS AND COMMUNITY

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.



During a campus visit, George W. Bush autographs final steel I-beam destined for new Technology and Learning Center.

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 coun-

tries. 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.



Architecture Building

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

YOUR CAMPUS AND COMMUNITY



Wayne H. Buell Management Building



Corporate Services Center



Applied Research Center



Don Ridler Field House

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 located 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.



Engineering Building



Science Building

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 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 consid-



University Housing Center



Affleck House

ered an outstanding example of Wright's work. For information about the Affleck House, contact the College of Architecture and Design.

STUDENT LIFE



ANNETT PHOTO

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

Professional organizations active on campus include student chapters of: American Institute of Architecture, American Chemical Society, American Production and Inventory Control Society, American Society of Architectural Illustration Students, American Society of Civil Engineers, American Society of Interior Designers, American Society of Mechanical Engineers, Associated General Contractors of America, Association for Computing Machinery, ESD - the Engineering Society, Institute

of Electrical and Electronic Engineers, Michigan Society of Professional Engineers, National Association of Home Builders, National Society of Black Engineers, Society of Automotive Engineers, Society for Human Resource Management, Society of Manufacturing Engineers, Society of Physics Students, Society for Technical Communication, and Society of Women Engineers.

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

STUDENT LIFE

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, stu-

dents 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



KINGS PHOTO

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 firecrackers, 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 build-

ings. 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.

STUDENT LIFE

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.



ANNETT PHOTO

SERVICES FOR STUDENTS



Lawrence Tech's 80 mpg hybrid electric FutureCar won the 2000 NYC-Washington D.C. Tour de Sol.

U.S. ENERGY DEPT. PHOTO

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

SERVICES FOR STUDENTS

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.

SERVICES FOR STUDENTS

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 mental or physical impairment that might affect their ability to succeed in the classroom. Students with documented disabilities may request modifications, accommodations, or auxiliary aids which will enable them to participate in and benefit from all educational programs and activities. Every attempt will be made to make reasonable accommodations to the University environment. You may direct dial a TDD phone at 248-204-4117. This phone is located in the Academic Achievement Center.

- 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.



BIZON PHOTO

STUDENT HOUSING



BIZON PHOTO

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.

STUDENT HOUSING

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.



CANTRELL PHOTO

RETROSPECT



MARKETING/PUBLIC AFFAIRS ARCHIVES PHOTO

Lawrence Tech's first campus bordered Henry Ford's Model T assembly plant.

“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

RETROSPECT

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.

MARKETING/PUBLIC AFFAIRS ARCHIVES PHOTO

ADMISSION TO THE UNIVERSITY



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 associ-

ate 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.

ADMISSION TO THE UNIVERSITY

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 a 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 bachelors 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



SINGER PHOTO

ADMISSION TO THE UNIVERSITY

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:



ADMISSION TO THE UNIVERSITY

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).

INTERNATIONAL STUDENT ADMISSION REQUIREMENTS

International students must have above average grades in their secondary and post-secondary academic course work. The following items must be submitted to the Admissions Office at least two months before the desired semester of enrollment:

1. Completed application for admission signed by the student, and non-refundable fee in U.S. currency;
2. Certified true copies of original academic transcripts;
3. Evidence of English proficiency;
4. An Affidavit of Support (for F-1 Visa holders);
5. An F-1 transfer clearance form (for F-1 students transferring from a U.S. college or university).

TRANSFERS WITHIN THE UNIVERSITY/ INTERRUPTION OF STUDIES

An interruption of studies occurs when a student does not attend classes for a full semester or more without special permission. Readmission is not automatic; admission policies and academic programs in place at that time will apply.

Students who have interrupted their studies for more than three calendar years or who wish to transfer to a different College within the University (example: Architecture to Engineering), must submit a new application and will be subject to the curricula and requirements of the chosen program upon their return.

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.

ADMISSIONS ADVISING AND TOURS

The Admissions Office is open year-round (except holidays). Admissions counselors are available on a walk-in basis on weekdays. Students are encouraged to call the Admissions Office with any questions, if they require additional information, or if they would like to schedule a tour of the campus at 248-204-3160 or toll-free: 800-CALL-LTU. Visit Lawrence Tech on the Internet at www.ltu.edu/.

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.

Direct inquiries regarding non-discrimination policies to: Office of Student Affairs, 21000 West Ten Mile Road, Southfield, MI 48075-1058 248-204-4100

TUITION AND FEES



SAUNDERS PHOTO

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

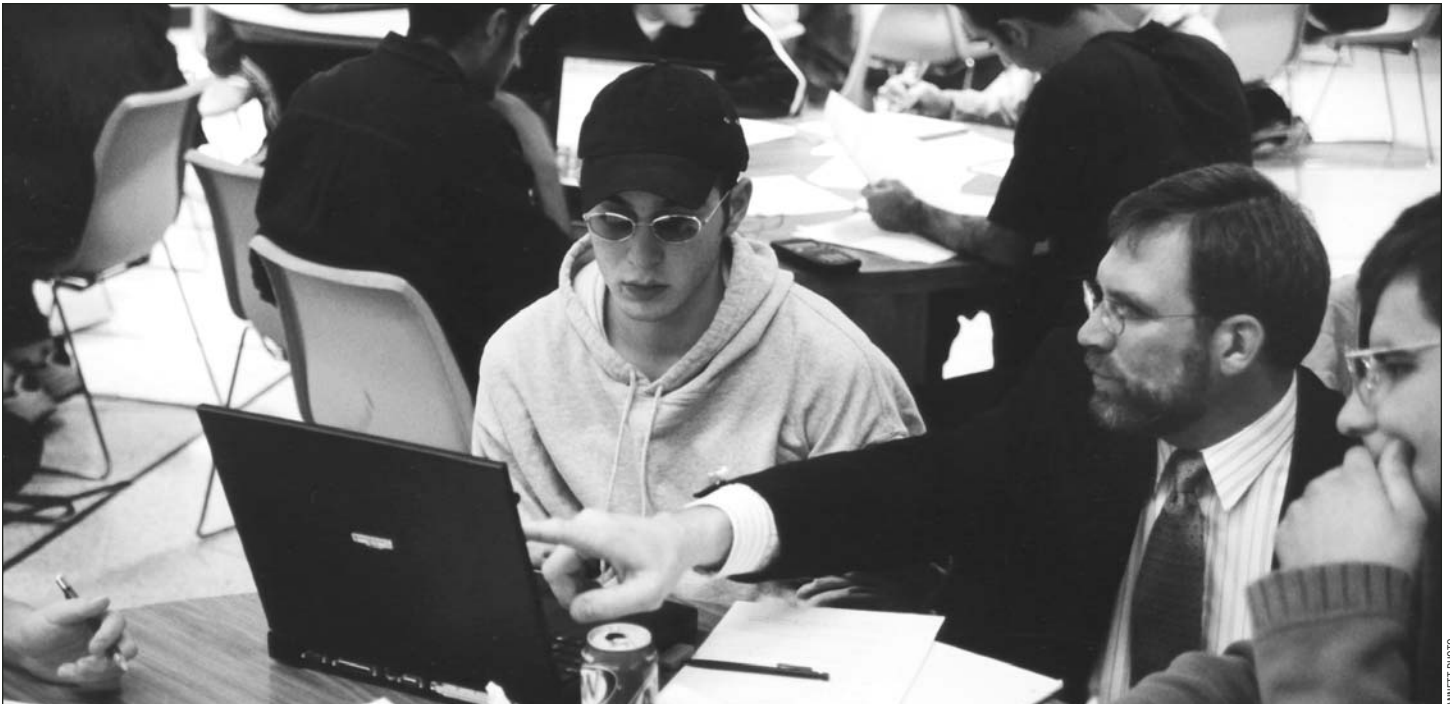
Costs for withdrawal are established as stipulated by federal regulations. The dates of actual credit to be received for withdrawal may be obtained at the Registrar's Office.

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.



ANNETT PHOTO

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 half-time 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.

FINANCIAL AID

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 \$2,000 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 fol-

lowing 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.

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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 descendants 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 upper-class architecture students with at least a 3.0 GPA. Number and value vary each year.

Martha Bichler Horltdt Scholarship — Made possible through the generosity of Henry and Barbara Horltdt. 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 Alumni Scholarship — Initiated through a charitable contribution from an anonymous alumnus and his wife. Preference given to upperclass engineering students with at least a 2.8 GPA. The awards range from \$1,000 to \$2,500 per year and may be renewable up to two additional years.

Lawrence Tech Construction Alumni Scholarship — Set up through a fund-raising process established by the LTCAS Fund-raiser 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.



CANTRELL PHOTO

FINANCIAL AID

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 the 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.



SMITH PHOTO

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

FINANCIAL AID

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 Rogvov, 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);

FINANCIAL AID

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.



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ACADEMIC REGULATIONS



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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:

Semester hours

Freshman	0-29
Sophomore	30-59
Junior	60-89
Senior	90+

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:

Grade Points per Credit Hour

A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
D-	0.7
F	0.0

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

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

W	Withdrawal
X	Audit
CR	Credit
NC	No Credit
I	Incomplete
DG	Deferred Grade
NR	No Report

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

ACADEMIC REGULATIONS

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:

Original grade	After recomputation
C-	C-R
D+	D+R
D	DR
D-	D-R
F	FR

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:

Semester Length:	Must withdraw Before:
5 weeks	4th week
6 weeks	5th week
7.5 weeks	6th week
10 weeks	8th week

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 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.

ACADEMIC REGULATIONS

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 less 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



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ACADEMIC REGULATIONS

at the time of readmission. A student's requirement for graduation may be subject to reevaluation.

Students wishing to re-apply 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.



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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.

DEGREES AND GRADUATION



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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
- Architecture
- Business Administration*
- Chemistry
- Civil Engineering
- Computer Engineering
- Computer Science
- Construction Management
- Electrical Engineering
- Engineering Technology
- Environmental Chemistry
- Humanities
- Industrial Management
- Information Technology
- Mathematics
- Mathematics and Computer Science
- Mechanical Engineering
- Physics
- Physics and Computer Science
- Technical Communication
- Technology Management

Master of Architecture, professional degree

Master of Architecture, post-professional degree

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.

DEGREES AND GRADUATION

DOUBLE MAJORS

Students who want to broaden and enhance their educations 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.

DUAL DEGREES

Students have the opportunity to earn bachelor's degrees in two majors in as few as five years. In order to earn dual degrees, students must complete all of the course requirements for both majors and earn a total of at least 150 semester hours of academic credit.

Anyone planning to pursue a dual degree program should consult the department chairs of the two majors being considered. Careful planning and course scheduling are necessary for the timely completion of both degrees.

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 1 and 2.....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;
- Attainment of a minimum grade point average of 2.00 in the major field;
- 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

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.



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COLLEGE OF ARCHITECTURE AND DESIGN



ANNETT PHOTO

Dean:

Neville H. Clouten, A116,
Ext. 2805

Associate Dean

Betty-Lee Seydler-Hepworth,
A115, Ext. 2808

Faculty Council:

James Abernethy
Aydan Ilter
Rochelle Martin
Thomas J. Nashlen
Steven Rost

Advisory Council on Architecture:

ANN BELLEAU-MILLS, AIA,
principal, Smith Group
Incorporated

PAUL BERNARD,
director, planning & development,
City of Detroit

JOHN CZARNECKI, AIA, AR'78, BAR'79
vice president,
Barton Malow Company

JAMES GRIGSBY, AIA, AR'70,
(CHAIR)
vice president, JPRA Architects

BILL HARTMAN, AIA,
director of design, Gensler

ERIC HILL, FAIA
manager, collaborative dept.,
Albert Kahn Associates

DAMON LEVERETT, AIA AR'83
Albert Kahn Associates

BARBARA A. MCGEE, AIA

principal project manager,
HarleyEllis

ARTHUR F. SMITH, FAIA, AR'78, BAR'81

Gensler

NEVILLE H. CLOUTEN, FRAIA

dean, College of Architecture
and Design, Lawrence
Technological University

Betty-Lee Seydler-Hepworth, AIA

associate dean, Lawrence
Technological University

AIAS PRESIDENT OR NOMINEE

Lawrence Technological
University

CHAIR, FACULTY COUNCIL OR NOMINEE

Lawrence Technological
University

Advisory Council on Architectural Imaging:

RON CHURCH
Richard Rochon Associates

LAURA CLARY, AR'95
HarleyEllis

HARVEY FERRERO, ARE'55,
Harvey Ferrero Architect

JON KLETZIEN
Advanced Media Design

WILLIAM J. MITCHELL

dean
School of Architecture
Massachusetts Institute of
Technology

PAUL S. OLES, FAIA

Interface Architects

HENRY SORENSON

Professor, Montana State
University

PAUL XUN WANG

Rosetti Architects

Advisory Council on Interior Architecture:

JOHN BODAG, ASID
vice president & director of
design

Ford & Earl Associates, Inc.

THOMAS ERNST, ASID

chairman & CEO
Ford & Earl Associates, Inc.

JAMES M. KOSLOWSKI, ASID

manager interior design
Giffels Associates, Inc.

GERALD PETERS, ASID

president
Minoru Yamasaki Associates, Inc.

KATHLEEN REEHIL, AIA

director of interior design
Gensler.

HARRELL SCARCELLO, ASID

president
Scarcello Associates, Inc.

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

comprehensive response to human needs, dominates 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 may be formulated by the student, in consultation with an advisor, based on a "Guide to Course Offerings," available in the College's administrative office.

For firsthand experience, great emphasis is placed on field trips which may be a part of any course offered by the College.

Transfer students are encouraged to enter any of the degree programs in which they have the interest and qualifications. When a complete or accurate description of previous course work is lacking, transfer students may be asked to present a portfolio of work, complete specific studio problems, or enroll in certain courses to ensure correct placement within the program.

Lawrence Tech's College of Architecture and Design is a member of the Association of Collegiate Schools of Architecture and the National Institute for Architectural Education. The M.Arch. professional degree program is accredited by the National Architectural Accrediting Board (NAAB). The B.S. in interior architecture program is accredited by the Foundation for Interior Design Education Research (FIDER) and the National Association of Schools of Art and Design (NASAD). The Bachelor of Fine Arts in Architectural Imaging is also accredited by NASAD.

The following statements have been prepared by NAAB for inclusion in the catalogs of all architecture programs:

"In the United States, most state registration boards require a degree from 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 consult with 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

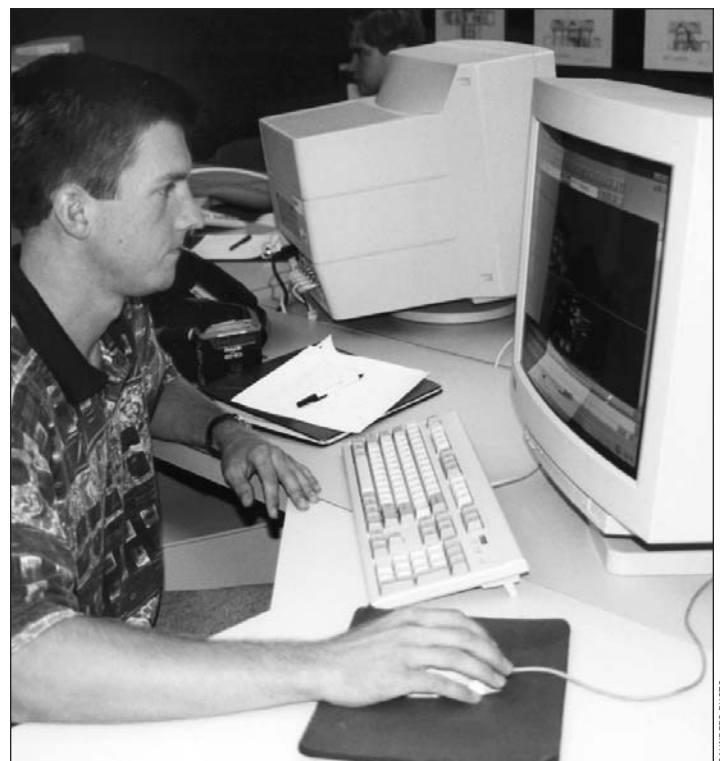
The 36-credit M. Arch. graduate degree program meets the academic credentials for pro-

fessional 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*.



SAUNDERS PHOTO

COLLEGE OF ARCHITECTURE AND DESIGN

BACHELOR OF SCIENCE IN ARCHITECTURE

TOTAL SEMESTER CREDIT HOURS: 132

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.	Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1	COM2103	Tech & Prof Com	3
COM1103	English Comp	3	SSC2423	Devel Am Exper	3
SSC2413	Found Am Exper	3	MCS1224	Intro Math Anal 2	4
MCS1203	Logic	3	ARC1133	Basic Design 2	3
ARC1113	Basic Design 1	3	ARC1223	Vis Comm 2	3
ARC1213	Vis Comm 1	3	ARC1002	Art/Arch Aware	2
ARC1000	Art/Arch Aware	0			18
		16			

SOPHOMORE YEAR

LLT1213	World Masterpcs 1	3	LLT1223	World Masterpcs 2	3
ARC3613	Hist/Des Env 1	3	ARC3623	Hist/Des Env 2	3
PHY2213	College Physics 1	3	PHY2223	College Physics 2	3
PHY2221	College Phys Lab	1	ARC2127	Integ Des Studio 2	7
ARC2117	Integ Des Studio 1	7			16
		17			

JUNIOR YEAR

ARC2313	Building Systems 1	3	ARC3413	Env Systems 1	3
ARC2514	Structures 1	4	ARC2323	Building Systems 2	3
ARC3117	Integ Des Studio 3	7	ARC3523	Structures 2	3
	Arch Elective	3	ARC3127	Integ Des Studio 4	7
		17			16

SENIOR YEAR

ARC4533	Structures 3	3	Allied Des Studio or		
ARC4114	Arch Des Studio 5	4	Des Stu Elec		4
ARC4423	Envir Sys 2	3	Arch Electives		9
	Arch Electives	6	LLT/SSC/ PSY3	Jr/Sr Elective	3
		16			16

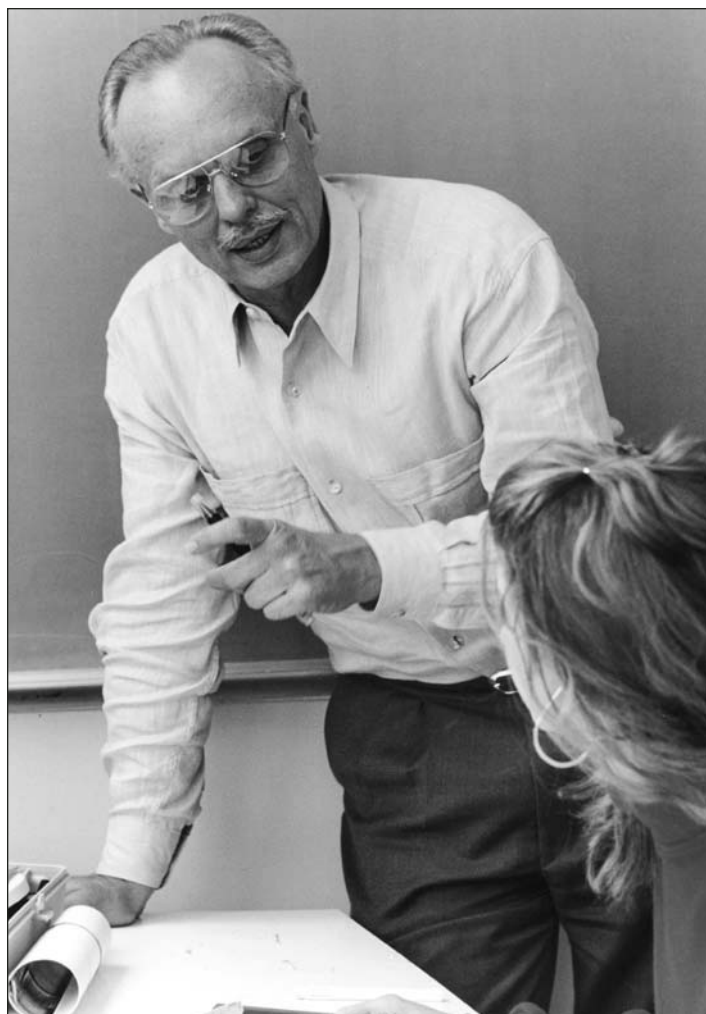
NOTES: ARC4183, *Twentieth Century Architecture*, is strongly recommended for all candidates for the M.Arch. professional degree program.

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



COLLEGE OF ARCHITECTURE AND DESIGN

BACHELOR OF FINE ARTS IN ARCHITECTURAL IMAGING

TOTAL SEMESTER CREDIT HOURS: 133

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
SSC2413	Found Am Exper	3
MCS/SSC/LLT/		
PSY/COM	Elective	3
ARC1113	Basic Design 1	3
ARC1213	Vis Comm I	3
ARC1000	Art/Arch Aware	0
		16

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM2103	Tech and Prof Com	3
SSC2423	Devel Amer Exper	3
MCS1254	Geometry in Art	4
ARC1002	Art/Arch Aware	2
ARC1133	Basic Design 2	3
ARC1223	Vis Comm 2	3
		18

SOPHOMORE YEAR

LLT1213	World Masterpcs 1	3
ART2223	Sketching for Illus	3
PHY2213	College Physics 1	3
PHY2221	College Phys Lab	1
ARC2117	Integ Des Studio 1	7
		17

LLT1223	World Masterpcs 2	3
ART2233	Illustration Comp	3
PHY2223	College Physics 2	3
ARC2127	Integ Des Studio 2	7
		16

JUNIOR YEAR

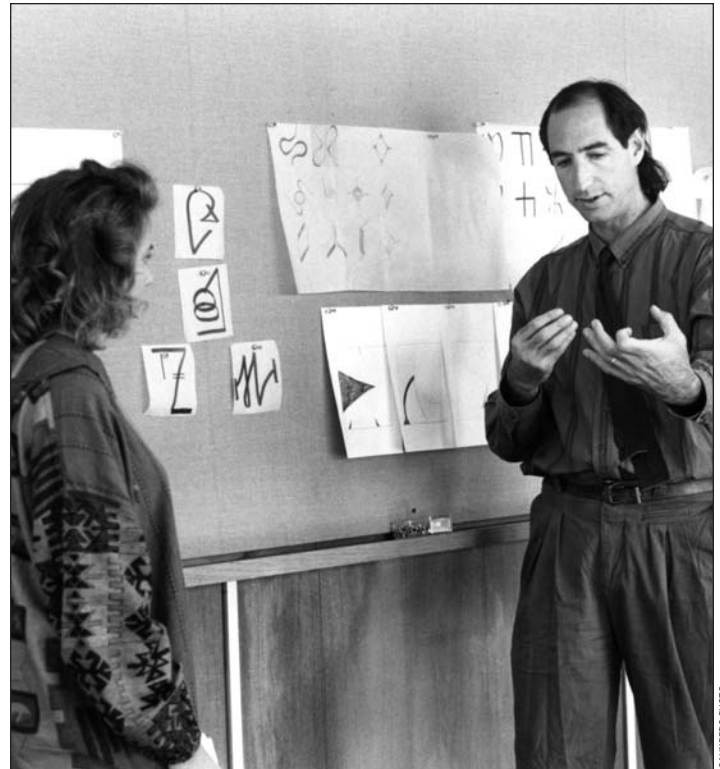
ART3212	Arch Illustr 1	2
ARC3633	West Trad of Art	3
ARC3613	History/Des Envi 1	3
ARC2313	Bldg Systems 1	3
ARC2813	Electronic Meth 1	3
ART3023	Photography	3
		17

ART3223	Arch Illustr 2	3
ART3603	Hist of Arch Illust	3
ARC3623	History/Des Envi 2	3
ARC2323	Bldg Systems 2	3
ARC3823	CAD 2	3
		15

SENIOR YEAR

ART4233	Arch Illustration 3	3
ART4512	Senior Thesis 1	2
MGT2113	Intro to Bus Law	3
ARC4203	Graphics Systems	3
ART3213	Sculpture	3
ART3323	Portfolio Design	3
		17

ART4243	Arch Illustration 4	3
ART4522	Senior Thesis 2	2
LLT/SSC/		
PSY3	Jr/Sr Elective	3
	Arch Elect or Intern	3
	Arch Electives	6
		17



SAUNDERS PHOTO

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

COLLEGE OF ARCHITECTURE AND DESIGN

BACHELOR OF INTERIOR ARCHITECTURE

TOTAL SEMESTER CREDIT HOURS: 133

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
SSC2413	Found Am Exper	3
MCS/SSC/LLT/		
PSY/COM	Elective	3
ARC1113	Basic Design 1	3
ARC1213	Vis Comm 1	3
ARC1000	Art/Arch Aware	0
		16

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM2103	Tech & Prof Comm	3
SSC2423	Devel Am Exper	3
MCS1254	Geometry in Art	4
ARC1133	Basic Design 2	3
ARC1223	Vis Comm2	3
ARC1002	Art/Arch Aware	2
		18

SOPHOMORE YEAR

LLT1213	World Masterpcs 1	3	LLT1223	World Masterpcs 2	3
ARC3613	Hist/Des Envir 1	3	ARC3623	Hist/Des Envir 2	3
PHY2213	College Physics 1	3	PHY2223	College Physics 2	3
PHY2221	College Phys Lab	1	ARC2127	Integ Des Studio 2	7
ARC2117	Integ Des Studio 1	7			16
		17			

JUNIOR YEAR

ARC2514	Structures 1	4	ARC3413	Envir Systems 1	3
ARC2313	Building Sys 1	3	ARC2323	Bldg Systems 2	3
ARC3633	West Trad of Art	3	ARI4103	Graphics	3
ART3212	Arch Illustr 1	2	ARI3128	Interior Arch 2	8
ARI3115	Interior Arch 1	5			17
		17			

SENIOR YEAR

ARI4133	Interior Arch 3	3	ARI4353	Preservation Tech	3
ARI4143	Advanced Lighting	3	ARI4922	Internship Studies	2
ARI4112	History of Furniture	2	ARC4234	Allied Des Stud: IA	4
ARI4223	Interior Des Pract	3	ARI4123	Environ Psych	3
	Arch Electives	6	LLT/SSC/		
		17	PSY3	Jr/Sr Elective	3
					17

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



CANFIELD PHOTO

COLLEGE OF ARCHITECTURE AND DESIGN

DEPARTMENT OF ARCHITECTURE

Professors:

James Abernethy
William S. Allen
Robert D. Champlin, emeritus
David M. Chasco (chairperson)
Neville H. Clouten
Betty-Lee Seydler-Hepworth
John V. Sheoris

Associate Professors:

Thomas M. Barrie
Daniel Faoro
Gretchen Maricak
Rochelle Martin
Thomas J. Nashlen
Danny Price

Assistant Professor:

Aydan Ilter
Eric M. Hemingway
Joongsub Kim
Edward M. Orłowski

Lecturers:

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

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

ARC0113 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 1.)

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 1.)

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 1

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. Principles include balance, rhythm, repetition, gradation structure, transparency, proportion and contrast. Introduction to color theory and application, design methodology, and visual/verbal techniques necessary for design conceptualization and presentation. Studio 6 hrs. *3 hours credit*

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*



CAMERON PHOTO

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, shades and shadows, model construction, basic delineation and drawing from observation. Introduction to methods of free-hand 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*

ARC3413 ENVIRONMENTAL SYSTEMS 1

Prerequisite: PHY2223, ARC2127. Basic electrical theory as it relates to building construction, electrical problems in power and distribution. Illumination design, natural and artificial sources, and energy conservation. Theory and analysis of architectural acoustics, room acoustics, sound isolation (indoor/outdoor), sound absorption and electronic sound reinforcement. Study of speech privacy, speech clarity and music spaces. Acoustical properties of materials. Lect. 3 hrs. *3 hours credit*

ARC3523 STRUCTURES 2

Prerequisite: ARC2514. Analysis and design of different steel members in tension, compression, and bending using AISC Code. Analysis and design of beam-columns. Design of welded and bolted connections. Lect. 3 hrs. *3 hours credit*

ARC3613 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*

ARC3623 HISTORY OF THE DESIGNED ENVIRONMENT 2

Prerequisite: ARC3613. 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*

ARC3633 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. 3hrs. *3 hours credit*

ARC3643 WESTERN TRADITIONS OF ART 2

Prerequisite: 0. Painting, sculpture, and the graphic arts in the western world from the eoclassic period to the present. The same development as given in ARC3633, 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 work 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. Lect. 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*



DEPARTMENT OF ART AND DESIGN

PROFESSOR:

Virginia North (chairperson)

ASSOCIATE PROFESSORS:

Thomas Regenbogen
Steven Rost

ASSISTANT PROFESSOR:

Maria Sipos

SENIOR LECTURER:

Gretchen Rudy
Roy J. Strickfaden

LECTURERS:

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

ILLUSTRATION

ART2113 LIFE DRAWING

Prerequisite: Sophomore standing or coordinator's approval.

Fundamentals of drawing the nude human figure in relationship to the attainment of representative abilities that result in the conscious development of expressive drawings. Use of line quality, exaggeration, distortion, and design to create unique interpretations of the figure and other illustration subjects. The individuality and expression of the subject are captured through dramatization of gestures and exaggeration of expressive qualities of subject attributes. 20th century art is presented as a means of understanding the range of possibilities of formal relationships. Studio 6 hrs. 3 hours credit

ART2223 SKETCHING FOR ILLUSTRATION

Prerequisite: Sophomore standing or coordinator's approval. The evolution of quick, definitive sketch ideation and architectural illustration processes where speed and clarity are of chief importance. This approach results in

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: ART3212 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 experiential 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: ARI4133. 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*

COLLEGE OF ARTS AND SCIENCES



BIZON PHOTO

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Associate Dean:

Glen A. Bauer, S101, ext. 3500

Faculty Council:

Sonia Henckel
Barry W. Knister
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first vice president, systems
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NBD Bank N.A.

ROBERT L. RICHARDSON
president
Concept 28 Associates

PATRICK J. SCULLION, ME'63, IM'76
president and CEO
MCN Investment Corporation
(ret.)

MICHAEL WIDER
director of new technology
Flint Ink Corporation

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

COLLEGE OF ARTS AND SCIENCES

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:

- apply LTU's advanced computing expertise and facilities in the solving of mathematical problems; and
- engage in team-oriented experiences, including state and national competitions, designed to help students take part in, and lead, project teams on the job.

MATHEMATICS AND COMPUTER SCIENCE

The Bachelor of Science in Mathematics and Computer Science degree offers the widest variety of career paths after graduation. It also provides the most rigorous preparation for higher-level problem solving and for graduate school. In addition to the advantages listed above for Computer Science, 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;

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- 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.

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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 uni-

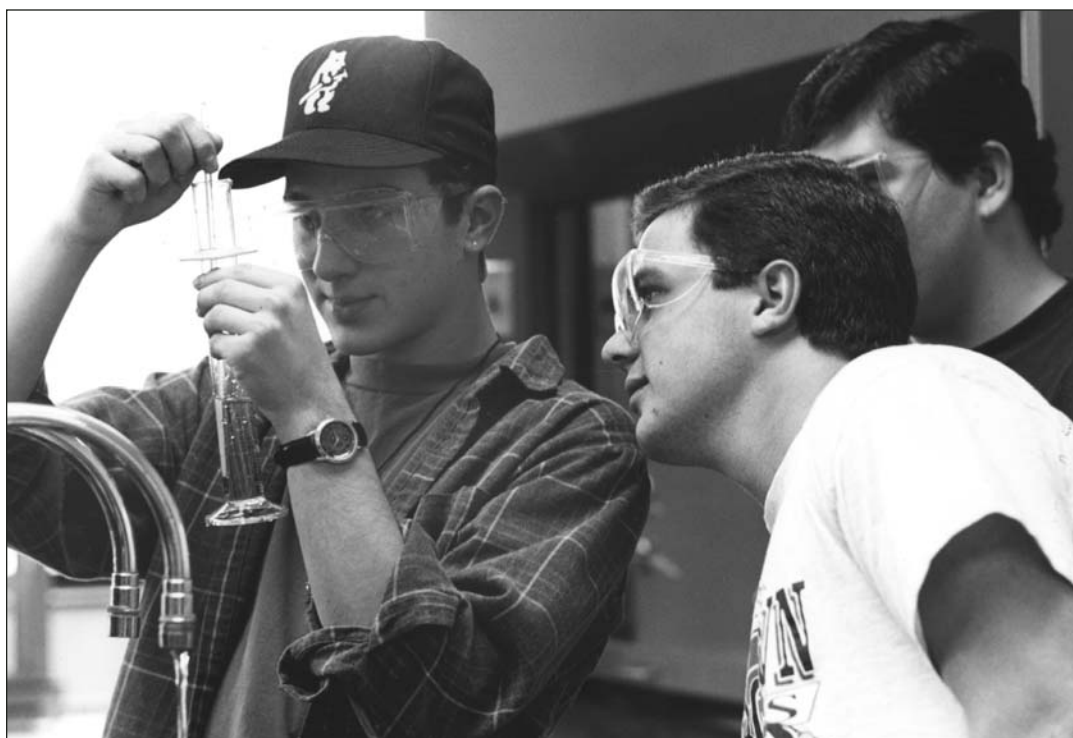
versity studies benefit from Lawrence Tech's outstanding faculty, small class sizes, structured core curriculum, state-of-the-art technology and impressive laboratory facilities. In addition, students will consult with academic advisors genuinely interested in the needs and educational goals of each 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.



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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

Humanities	31 semester hours
Mathematics	8 semester hours
Statistics	3 semester hours
Science	7 semester hours
Management core	30 semester hours
Electives	42 semester hours
	<hr/> 121 semester hours

HUMANITIES

Humanities	70 semester hours
Computer Science	3 semester hours
Mathematics	8 semester hours
Science	7 semester hours
Electives	33 semester hours
	<hr/> 121 semester hours

TECHNICAL COMMUNICATION

Humanities	67 semester hours
Computer Science	6 semester hours
Mathematics	11 semester hours
Science	7 semester hours
Electives	30 semester hours
	<hr/> 121 semester hours

MATHEMATICS AND COMPUTER SCIENCE

COMPUTER SCIENCE

Humanities	28 semester hours
Natural Science	7-8 semester hours
Mathematics	18-19 semester hours
Computer Science	47 semester hours
Electives	18-21 semester hours
	<hr/> 120-121 semester hours

MATHEMATICS/COMPUTER SCIENCE

Humanities	28 semester hours
Chemistry	4 semester hours
Physics	8 semester hours
Mathematics	43 semester hours
Computer Science	32 semester hours
Electives	6 semester hours
	<hr/> 121 semester hours

MATHEMATICS

Humanities	28 semester hours
Chemistry	7 semester hours
Physics	8 semester hours
Mathematics	46 semester hours
Computer Science	12 semester hours
Electives	21 semester hours
	<hr/> 122 semester hours

NATURAL SCIENCES

CHEMISTRY

Chemistry	
Option 1	53 semester hours
Option 2	41 semester hours
Option 3	40 semester hours
Computer Science	2 semester hours
Humanities	28 semester hours
Mathematics	15 semester hours
Physics	8 semester hours
Engineering	
Option 3	31 semester hours
Biology	
Option 2	15 semester hours
General Electives	
Option 1	17 semester hours
Option 2	12 semester hours
Option 3	3 semester hours
	<hr/> 121-127 semester hours

ENVIRONMENTAL CHEMISTRY

Chemistry	48 semester hours
Computer Science	2 semester hours
Engineering	10 semester hours
Geology	3 semester hours
Humanities	28 semester hours
Mathematics	15 semester hours
Physics	11 semester hours
Electives	3 semester hours
	<hr/> 120 semester hours

CHEMICAL TECHNOLOGY

Chemistry	22 semester hours
Computer Science	5 semester hours
Humanities	19 semester hours
Mathematics	11 semester hours
Physics	4 semester hours
	<hr/> 61 semester hours

PHYSICS/COMPUTER SCIENCE

Physics	42 semester hours
Mathematics	24 semester hours
Humanities	28 semester hours
Chemistry	9 semester hours
Computer Science	20 semester hours
Electives	3 semester hours
	<hr/> 126 semester hours

PHYSICS

Physics (8 hours taught in engineering)	46 semester hours
Mathematics	24 semester hours
Humanities	28 semester hours
Chemistry	9 semester hours
Computer Science	2 semester hours
Electives	11 semester hours
	<hr/> 120 semester hours

UNIVERSITY STUDIES

Humanities	22 semester hours
Natural Science	7 semester hours
Mathematics	7 semester hours
Computer Science	3 semester hours
Electives	21 semester hours
	<hr/> 60 semester hours

COLLEGE OF ARTS AND SCIENCES

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.

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

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:

	Elective Requirements	Sem. Hrs.	Lawrence Tech Courses
	1 course in Organic Chemistry	3	CHM2313
	1 course in basic Biology & Lab	4	BIO1213 & BIO1221
	1 Physiology, Anatomy, Experimental Psychology or Pharmacology	4	BIO1223 & BIO1231

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:

	Law	Communication
	MGT2113 Introduction to Business Law	COM2113 Speech
	SSC4143 Constitutional Law: Individual Rights	COM2443 Intro to Rhetoric Logic
	History, Philosophy, and Political Science	COM3103 Adv Pro Communication
	SSC3153 American History to 1877	COM3463 Collaborative Communication
	SSC3163 American History since 1877	COM3553 Interpers and Nonverbal Comm
	SSC3173 American Political Tradition	Business
	SSC3723 Ethics	ACC2013 Accounting Principles 1
	SSC4133 Problems in International Politics	ACC2023 Accounting Principles 2
		FIN3013 Intro to Financial Mgt
		MGT2203 Management and Supervision

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.

Continued on next page

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MINOR IN PSYCHOLOGY

A minor in psychology is offered as part of three bachelor's degree programs: the B.S. in Administration, the B.S. in Humanities, and the B.S. in Technical Communication. The minor combines an exploration of the major fields of psychology along with the essential tools of statistical methods needed for psychological research.

PSY1213	Introductory Psychology
PSY3613	Developmental Psychology
PSY3623	Social Psychology
PSY3633	Abnormal Psychology
HRM3013	Organizational Behavior
MCS2113	Statistics 1
MCS2123	Statistics 2

CONTACT PERSON: Dr. Gonzalo Munevar, ext. 3520, Username: HUMCHAIR@LTU.EDU

FIVE-YEAR COMBINED B.S. AND MANAGEMENT MASTER'S DEGREES

Humanities/M.B.A.	Humanities/M.S.I.S.
Technical Communication/M.B.A.	Technical Communication/M.S.I.S.

Humanities and Technical Communication students may complete the Lawrence Tech M.B.A. or the M.S.I.S. pre-core requirements by choosing the appropriate electives. They can then earn the M.B.A. or M.S.I.S. in one additional year after receiving their bachelor's degrees. For more information and a list of suggested course sequences, contact the Humanities, Social Sciences and Communication department chair, ext. 3520.

DUAL MAJORS

Chemistry with: Engineering, Physics
 Physics with: Engineering, Chemistry
 Computer Science with: Engineering, Chemistry
 Mathematics with: Engineering

For further information about these Dual Majors and about minors, please see individual major program descriptions or contact the advisor listed for the major program.

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.

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1002	Univ Studies Sem	2
COM1103	English Comp	3
MCS1003	Intro to Comp Appl	3
MCSXXX3	Mathematics	3
	Elective	3
		14

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
LLT1213	World Mastrpcs 1	3
SSC2413	Found Amer Exper	3
COM2103	Tech & Prof Comm	3
MCS1XX4	Mathematics	4
	Elective	3
		16

THIRD SEMESTER

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

FOURTH SEMESTER

	HSSC Elective	3
	Natural Science 2	3
	Natural Sci Lab	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.

COLLEGE OF ARTS AND SCIENCES

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)

MATHEMATICS/STATISTICS (11 CREDIT HOURS)

	Cr. Hrs.
MCS1214 Math Analysis 1	4
MCS1224 Math Analysis 2	4
MCS2113 Statistics 1	3

SCIENCE (7 CREDIT HOURS)

PSC1113 Physical Science 1	3
PSC1123 Physical Science 2	3
PSC1131 Physical Science Lab	1

ENGLISH/COMMUNICATIONS (10 CREDIT HOURS)

COM1001 University Seminar	1
COM1103 English Comp	3
COM2103 Tech & Prof Comm	3
COM3103 Adv Prof Comm	3

HUMANITIES (15 CREDIT HOURS)

LLT1213 World Masterpieces 1	3
LLT1223 World Masterpieces 2	3
SSC2413 Found Amer Exper	3
SSC2423 Devel Amer Exper	3
LLT/SSC/PSY Jr/Sr level elective	3

ECONOMICS (6 CREDIT HOURS)

SSC2313 Macroeconomics	3
SSC2323 Microeconomics	3

MANAGEMENT CORE (30 CREDIT HOURS)

MGT2203 Management & Supervision	3
MGT2113 Intro Business Law	3
ACC2013 Accounting Principles 1	3
ACC2023 Accounting Principles 2	3
HRM3013 Org Behavior	3
MKT3013 Principles of Marketing	3
FIN3103 Intro Finance Mgt	3
TOM3113 Operations Management	3
MGT4213 Strategic Management	3
INT3023 Information Technology	3

Plus additional electives to total 121 semester hours

For more information about the Administration 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 HUMANITIES

TOTAL SEMESTER CREDIT HOURS: 121

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
MCS1003	Intro to Comp Appl	3
MCS1214	Intro to Math An 1	4
PSC1113	Physical Science 1	3
		14

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
PSC1123	Physical Science 2	3
PSC1131	Phys Science Lab	1
LLT1213	World Masterpcs 1	3
SSC2413	Found Amer Exper	3
MCS1224	Intro to Math An 2	4
PSY1213	Intro Psychology	3
		17

SOPHOMORE YEAR

COM2103	Tech & Prof Comm	3	COM2113	Speech	3
LLT1223	World Masterpcs 2	3	SSC2303	Princ Economics	3
SSC2423	Devel Am Exper	3	SSCXXX3	Soc Sci Elective	3
		6			6
		15			15

JUNIOR YEAR

LLT3113	Eng Lit to 1800	3	LLT3123	Eng Lit 1800-1914	3
LLT3213	Amer Lit to 1900	3	LLT3223	Amer Lit:1990-Pres	3
SSCXXX3	Soc Sci Elective	3	SSCXXX3	Soc Sci Elective	3
		6			6
		15			15

SENIOR YEAR

LLT4113	Early Shakespeare	3	LLT4123	Later Shakespeare	3
LLT4513	Sem in Lit	3	LLTXXX3	Lang/Lit Elective	3
SSCXXX3	Soc Sci Elective	3	SSC4513	Sem in Soc Sci	3
		6	SSCXXX3	Soc Sci Elective	3
		15			3
					15

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.

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BACHELOR OF SCIENCE IN TECHNICAL COMMUNICATION

TOTAL SEMESTER CREDIT HOURS: 121

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
MCSXXX3	Comp Appl	3
MCS1214	Intro to Math An 1	4
PSC1113	Physical Science 1	3
		14

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM2113	Speech	3
MCS1224	Intro to Math An 2	4
PSC1123	Physical Sci 2	3
PSC1131	Physical Sci Lab	1
PSY1213	Intro Psychology	3
		14

SOPHOMORE YEAR

COM2103	Tech & Prof Comm	3
LLT1213	World Masterpcs 1	3
SSC2303	Princ of Econ	3
SSC2413	Found Am Exper	3
COM2443	Intro Rhet/Logic	3
		15

COM3553	Interpersonal Com	3
COM3453	Resrch Prin/Meth	3
LLT1223	World Masterpcs 2	3
SSC2423	Devel Am Exper	3
	Open Elective	3
		15

JUNIOR YEAR

COM3463	Collab Comm	3
COM3473	Document Design	3
COM3543	Tech Editing or	
COM3493	Resrch Rep & Pres	3
MCS2113	Statistics 1	3
SSCXXX3	Soc Sci Elective	3
	Open Elective	3
		18

COM3103	Adv Tech & Prof	3
COM3483	Pres Media	3
MCS2123	Statistics 2	3
	Open Elective	3
	Tech Elective	3
		15

SENIOR YEAR

COM4113	Internship/Sen Prj	3
LLTXXX3	Lang/Lit Elective	3
	Comm Electives	6
	Tech Elective	3
		15

SSCXXX3	Soc Sci Elective	3
	Open Electives	6
	Tech Electives	6
		15

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.

BACHELOR OF SCIENCE IN COMPUTER SCIENCE - OPTION 1

TOTAL SEMESTER CREDIT HOURS: 120

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
SSC2413	Found Am Exper	3
		13

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
SSCXXX3	Elective	3
LLT1213	World Masterpcs 1	3
MCS1424	Calculus 2	4
MCS1514	Computer Sci 1	4
SSC2423	Devel Am Exper	3
		17

SOPHOMORE YEAR

LLT1223	World Masterpcs 2	3
MCS2414	Calculus 3	4
MCS2514	Computer Sci 2	4
MCS2524	Discrete Math	4
		15

COM2103	Tech & Prof Comm	3
MCS2534	Data Structures	4
MCS3633	Functional Prog	3
MCSXXX3	Elective	3
		13

JUNIOR YEAR

MCS3543	Data Base Sys	3
MCS3663	Arch & Assembler	3
MCSXXX3	Math Elective*	3
PHY2413	Univ Physics 1	3
PHY2421	Univ Phys 1 Lab	1
MCSXXX3	Elective	3
		16

MCSXXX3	Eelctive	3
MCS4663	Operating Syst	3
PHY2423	Univ Physics 2	3
PHY2431	Univ Phys 2 Lab	1
	Open Electives	6
		16

SENIOR YEAR

MCS4613	Comp Networks	3
MCS4833	Senior Project	3
SSCXXX3	Jr/Sr Elective	3
	Open Electives	6
		15

LLTXXX3	Jr/Sr Elective	3
MCS4643	Comp Prog Lang	3
MCS4653	Theory/Computation	3
	Open Electives	6
		15

**Note: Students must take either MCS2423 Diff Equations or MCS3403 Prob & Stats or MCS3863 Linear Algebra*

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.

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF SCIENCE IN COMPUTER SCIENCE - OPTION 2

TOTAL SEMESTER CREDIT HOURS: 121

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.	SECOND SEMESTER Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1	LLT1213	World Masterpcs 1	3
COM1103	English Comp	3	SSC2423	Devel Am Exper	3
PSC1113	Physical Sci 1	3	MCS1224	Intro Math Anal 2	4
MCS1142	Intro to C	2	MCS1514	Computer Sci 1	4
MCS1214	Intro Math Anal 1	4			14
SSC2413	Found Am Exper	3			
		16			

SOPHOMORE YEAR

LLT1223	World Masterpcs 2	3	COM2103	Tech & Prof Comm	3
MCS2514	Computer Sci 2	4	MCS2534	Data Structures	4
MCS2524	Discrete Math	4	MCS3633	Functional Prog	3
SSCXXX3	Elective	3	MCSXXX3	Elective	3
		14	PSC1123	Physical Sci 2	3
			PSC1131	Physical Sci Lab	1
					17

JUNIOR YEAR

MCS2113	Statistics 1	3	MCS2123	Statistics 2	3
MSC3543	Data Base Sys	3	MCSXXX3	Elective	3
MCS3663	Arch & Assembler	3	MCS4663	Operating Syst	3
MCSXXX3	Elective	3		Open Electives	6
	Open Elective	3			15
		15			

SENIOR YEAR

MCS4613	Comp Networks	3	LLTXXX3	Jr/Sr Elective	3
MCS4833	Senior Project	3	MCS4643	Comp Prog Lang	3
SSCXXX3	Jr/Sr Elective	3	MCS4653	Theory/Computation 3	
	Open Electives	6		Open Electives	6
		15			15

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	MCS4653
MCS2514	MCS4613	MCS4663
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

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.	SECOND SEMESTER Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1	LLT1213	World Masterpcs 1	3
COM1103	English Comp	3	SSC2423	Devel Am Exper	3
PSC1113	Physical Sci 1	3	MCS1224	Intro Math Anal 2	4
MCS1142	Intro to C	2	MCS1514	Computer Sci 1	4
MCS1214	Intro Math Anal 1	4	MCS1613	Visual Basic	3
SSC2413	Found Am Exper	3			17
		16			

SOPHOMORE YEAR

LLT1223	World Masterpcs 2	3	COM2103	Tech & Prof Comm	3
MCS2514	Computer Sci 2	4	MCS2534	Data Structures	4
MCS2524	Discrete Math	4	MCS3673	Network Admin	3
SSCXXX3	Elective	3	PSC1123	Physical Sci 2	3
		14	PSC1131	Physical Sci Lab	1
					14

JUNIOR YEAR

MCS2113	Statistics 1	3	MCS2123	Statistics 2	3
MSC3543	Data Base Sys	3	INT3103	Tech Man	3
MCS3663	Arch & Assembler	3	MCS4663	Operating Syst	3
MCSXXX3	Elective	3		Open Electives	6
	Open Elective	3			15
		15			

SENIOR YEAR

MCS4613	Comp Networks	3	LLTXXX3	Jr/Sr Elective	3
MCS4833	Senior Project	3	INT4203	Sys Analysis	3
SSCXXX3	Jr/Sr Elective	3	MCSXXX3	Elective	3
	Open Electives	6		Open Electives	6
		15			15

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.

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE

TOTAL SEMESTER CREDIT HOURS: 121

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
CHM1213	University Chem 1	3
CHM1221	Univ Chem 1 Lab	1
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
SSC2413	Found Am Exper	3

17

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
LLT1213	World Masterpcs 1	3
SSCXXX3	Elective	3
MCS1424	Calculus 2	4
MCS1514	Computer Sci 1	4
SSC2423	Devel Am Exper	3

17

SOPHOMORE YEAR

MCS2414	Calculus 3	4
MCS2514	Computer Sci 2	4
MCS2524	Discrete Math	4
PHY2413	Univ Physics 1	3
PHY2421	Univ Phys 1 Lab	1

16

LLT1223	World Masterpcs 2	3
MCS2423	Diff Equations	3
MCS2534	Data Structures	4
COM2103	Tech & Prof Comm	3
PHY2423	Univ Physics 2	3
PHY2431	Univ Phys 2 Lab	1

17

JUNIOR YEAR

SSCXXX3	Jr/Sr Elective	3
MCS3663	Arch & Assembler	3
MCS3723	Advanced Calculus	3
MCS3543	Data Base Sys	3
MCS3863	Linear Algebra	3

15

MCS4663	Operating Systems	3
MCS3403	Prob and Stat	3
MCS3523	Math Modeling	3
MCS3743	Complex Analysis	3
	Open Elective	3

15

SENIOR YEAR

MCS4833	Senior Proj	3
MCS3733	Part Diff Equat	
MCS4813	Num Anal 1	3
MCS4613	Comp Networks	3

12

LLTXXX3	Jr/Sr Elective	3
MCS4653	Theory/Computation	3
MCS4863	Modern Algebra	3
	Open Elective	3

12

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

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Sem	1
COM1103	English Comp	3
CHM1213	Univ Chemistry 1	3
CHM1221	Univ Chem 1 Lab	1
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
SSC2413	Found Amer Exper	3

17

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
CHM1223	Univ Chemistry 2	3
SSCXXX3	Elective	3
MCS1424	Calculus 2	4
MCS1514	Computer Sci 1	4
SSC2423	Devel Am Exper	3

17

SOPHOMORE YEAR

LLT1213	World Masterpcs 1	3
MCS2414	Calculus 3	4
MCS2524	Discrete Math	4
PHY2413	Univ Physics 1	3
PHY2421	Univ Phys 1 Lab	1

15

COM2103	Tech & Prof Comm	3
LLT1223	World Masterpcs 2	3
MCS2423	Diff Equations	3
PHY2423	Univ Physics 2	3
PHY2431	Univ Phys 2 Lab	1

13

JUNIOR YEAR

MCS3723	Advanced Calculus	3
MCS3543	Data Base Sys	3
MCS3863	Linear Algebra	3
SSCXXX3	Jr/Sr Elective	3
	Open Elective	3

15

MCS3403	Prob and Stats	3
MCS3523	Math Modelling	3
MCS3743	Complex Analysis	3
	Open Electives	6

15

SENIOR YEAR

MCS3733	Part Diff Equat	3
MCS4813	Numerical Anal 1	3
MCS4993	Topics in MCS	3
	Open Electives	6

15

LLTXXX3	Jr/Sr Elective	3
MCS4863	Modern Algebra	3
MCS4833	Senior Project	3
	Open Electives	6

15

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)

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.	Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1	CHM1233	University Chem 2	3
COM1103	English Comp	3	CHM1232	Univ Chem 2 Lab	2
CHM1213	University Chem 1	3	LLT1213	World Masterpcs 1	3
CHM1221	Univ Chem 1 Lab	1	MCS1424	Calculus 2	4
MCS1414	Calculus 1	4	SSC2423	Devel Am Exper	3
SSC2413	Found Am Exper	3			15
		15			

SOPHOMORE YEAR (except Engineering Chemistry)

CHM2313	Organic Chem 1	3	CHM2323	Organic Chem 2	3
CHM2342	Analytical Chem	2	CHM2332	Organic Chem Lab	2
CHM2352	Analytical Lab	2	LLT1223	World Masterpcs 2	3
PHY2413	Univ Physics 1	3	MCSXXX3	Advanced Math	3
PHY2421	Univ Physics 1 Lab	1	PHY2423	University Phys 2	3
MCS2414	Calculus 3	4	PHY2421	Univ Phys 2 Lab	1
		15			15

SOPHOMORE YEAR (Engineering Chemistry)

CHM2313	Organic Chem 1	3	CHM2323	Organic Chem 2	3
EGE1102	Engr Comp App Lab	2	CHM2332	Organic Chem Lab	2
LLT1223	World Masterpcs 2	3	EGE1023	Intro to Materials	3
PHY2413	Univ Physics 1	3	MTH2423	Differential Equat	3
PHY2421	Univ Physics 1 Lab	1	PHY2423	University Phys 2	3
MCS2414	Calculus 3	4	PHY2421	Univ Phys 2 Lab	1
		17			15

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@itu.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 JUNIOR YEAR
CHM3423; CHM3434; CHM3442; CHM3452; CHM3463; CHM4632; CHM4643; CHM4723; MCS1102 or MCS1142; 8 credits of chemistry electives and free electives (32 credits total)

SENIOR YEAR
CHM3403; CHM4522; CHM4542; COM2103; 21 credits of chemistry electives, social science electives and free electives (31 credits total)

Plan B JUNIOR YEAR
CHM3403; CHM3423; CHM3434; CHM3442; CHM4522; CHM4542; MCS1102 or MCS1142; 14 credits of chemistry electives, social science electives and free electives (32 credits total)

SENIOR YEAR
CHM3452; CHM3463; CHM4632; CHM4643; CHM4723; COM2103; 15 credits of chemistry electives, social science electives and free electives (31 credits total)

Bachelor of Science in Chemistry: Bio-Medical Option

Plan A JUNIOR YEAR
BIO1213; BIO1221; BIO1223; BIO1231; CHM3423; CHM3442; CHM3452; CHM4723; MCS1102 or MCS1142; 12 credits of chemistry electives, social science electives and free electives. (31 credits total)

SENIOR YEAR
BIO2313; BIO2321; BIO2323; CHM3403; COM2103; 17 credits of chemistry elective, social science electives and free electives (30 credits total)

Plan B JUNIOR YEAR
BIO1213; BIO1221; BIO1223; BIO1231; CHM3423; CHM3442; CHM3403; MCS1102 or MCS1142; 14 credits of chemistry electives, social science electives and free electives. (31 credits total)

SENIOR YEAR
BIO2313; BIO2321; BIO2323; CHM3452; CHM4723; COM2103; 15 credits of chemistry electives, social science electives and free electives (30 credits total)

COLLEGE OF ARTS AND SCIENCES

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
CHM3403; CHM3423; EME3013; CHM3434; CHM3442; CHM4522; CHM4542; EGE2013; EME3043; 8 credits of chemistry electives, engineering electives; social science electives and free electives (33 credits total)

SENIOR YEAR
CHM3452; COM2103; MCS1102 or MCS1142; EEE2123; EME3024; EME4013; EME4213; 12 credits of chemistry electives, engineering electives; social science electives and free electives (32 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

	Chemistry Options			Environ. Chem.
	1 ACS Cert	2 Bio Med	3 Engr Chem	
Freshman/Sophomore Credits:	60	60	62	60
CHM3383 Environ Chem				3
CHM3403 Biochemistry	3	3		3
CHM3423 Physical Chem 1	3	3	3	3
CHM3421 Phys Chem Lab 1	1	1	1	1
CHM3434 Physical Chem 2	4		4	4
CHM3431 Phys Chem Lab 2	1		1	1
CHM3452 Intermed Inorganic	2	2	2	2
CJM3463 Adv Synth Lab	3			3
CHM3601 Sem in Chem Top				1
CHM4522 Adv Spectroscopy	2			2
CHM4542 Physical-Anal Lab 2	2			2
CHM4632 Instr Anal Lab	2			2
CHM4643 Adv Inorganic Chem	3			
CHM4723 Advanced Organic	3	3		
CHMxxxx Chemistry Electives ¹	3	8	9	
BIO1213 Biology 1		3		
BIO1221 Biology Lab 1		1		
BIO1223 Biology 2		3		
BIO1231 Biology Lab 2		1		
BIO2313 Microbiology		3		
BIO2321 Microbiology Lab		1		
BIO2323 Genetics		3		
GLG1103 Geology				3
MCS1xxx Basic Programming ²	2	2	2	2
PHY1173 Rad & Env Physics				3
ECE3324 Environ Engr 1				4
ECE3523 Hydromechanics				3
ECE4343 Environ Engr 2				3
EGE2013 Statics			3	
EEE2123 Circuits			3	
EME2011 Engr Materials Lab			1	
EME3013 Mechanics of Matls			3	
EME3043 Dynamics			3	
EME3024 Fluid Mechanics			4	
EME4013 Heat Transfer			3	
EME4213 Advanced Materials			3	
EYYxxxx Engineering Electives			5	
COM2103 Tech & Prof Comm	3	3	3	3
LLTxxx3 Jr/Sr Elective	3	3	3	3
SSCxxx3 Elective	3	3	3	3
SSCxxx3 Jr/Sr Elective	3	3	3	3
General Electives	17	12	3	3
Curriculum Total:	123	121	127	120

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.

COLLEGE OF ARTS AND SCIENCES

With suitable electives you may design your curriculum to meet your career goals. Below are some suggested career options.

Chemistry: You may design your curriculum for entry into the many careers that chemists enjoy, from agricultural chemistry to material science, to pharmaceutical chemistry to water chemistry. See the department for a list of possible careers.

Pre-Medical: Follow the suggested electives on page 64 designated for the pre-medical program. Any option in the chemistry program is suitable as preparation for medical school. The ACS-certified option provides for a large number of electives that can be used to fulfill the pre-medical requirements. The bio-medical chemistry option automatically fulfills all pre-medical requirements without using any elective courses.

Pre-Chemical Engineering: The engineering chemistry option includes a wide variety of engineering courses that can satisfy the admission requirements in most chemical engineering graduate programs. Students in the ACS-certified version of the major can prepare for graduate training in chemical engineering with an appropriate choice of engineering electives. Consult the department chair for additional 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.

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
CHM2323 Organic Chemistry 2
CHM2332 Organic Chemistry Lab
CHM3723 Adv Organic Chemistry

Biochemistry:

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

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

Analytical Chemistry:

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

CHM2313 Organic Chemistry 1
CHM2323 Organic Chemistry 2
CHM2332 Organic Chemistry Lab
CHM2342 Analytical Chemistry
CHM2352 Analytical Chem Lab

Polymer Chemistry:

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

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

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

Environmental Chemistry:

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

CHM2313 Organic Chemistry 1
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.

COLLEGE OF ARTS AND SCIENCES



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ASSOCIATE OF SCIENCE IN CHEMICAL TECHNOLOGY

TOTAL SEMESTER CREDIT HOURS: 61

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Sem	1
COM1103	English Comp	3
CHM1213	University Chem 1	3
CHM1221	Univ Chem 1 Lab	1
MCS1003	Intro Comp Appl	3
MCS1214	Intro Math Anal 1	4
		15

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
CHM1223	University Chem 2	3
CHM1232	Univ Chem 2 Lab	2
LLT1213	World Masterpcs 1	3
MCS1224	Intro Math Anal 2	4
SSC2413	Found Amer Exp	3
		15

THIRD SEMESTER

CHM2313	Organic Chem 1	3
CHM2342	Analytical Chem	2
CHM2352	Analy Chem Lab	2
MCS1102	Intro to FORTRAN	2
MCS2023	Statistical Meth	3
SSC2423	Devel Amer Exp	3
		15

FOURTH SEMESTER

CHM2323	Organic Chem 2	3
CHM2332	Organic Chem Lab	2
CHM2631	Instrumental Lab	1
LLT1223	World Mast 2	3
PHY1154	Intro Phys Princ	4
	Hum Elective	3
		16

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.

COLLEGE OF ARTS AND SCIENCES

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

Humanities Courses

		Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Composition	3
COM2103	Tech & Prof Com	3
LLT1213	World Masterpcs 1	3
LLT1223	World Masterpcs 2	3
LLTXXX3	Jr/Sr Elective	3
SSC2413	Foun of American Experience	3
SSC2423	Dev of American Experience	3
SSCXXX3	Elective	3
SSCXXX3	Jr/Sr Elective	3

Math and Computer Courses

MCS1102	Intro to FORTRAN	2
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
MCS1424	Calculus 2	4
MCS2414	Calculus 3	4
MCS2423	Diff Equations	3
MCS3403	Prob & Stat	3
MCS3863	Linear Algebra	3

Chemistry Courses

CHM1213	Univ Chem 1	3
CHM1221	Univ Chem 1 Lab	1
CHM1223	Univ Chem 2	3
CHM1232	Univ Chem 2 Lab	2

Physics Courses

PSC1161	Phy Sci Seminar	1
PHY1173	Rad & Env Phys	3
PHY1181	Rad & Env Phys Lab	1
PHY2413	Univ Phys 1	3
PHY2431	Univ Phys 1 Lab	1
PHY2423	Univ Physics 2	3
PHY2431	Univ Physics 2 Lab	1
PHY3513	Theor Mech 1	3
PHY3523	Theor Mech 2	3
PHY3574	Elect & Magnetism	4
PHY3653	Cont Physics	3
PHY3661	Cont Physics Lab	1
PHY4724	Quantum Physics	4
PHY4743	Optics, Lasers & Microscopy	3
PHY4781	Optics, Lasers & Microscopy Lab	1
PHY4843	Condensed Matter Physics	3
PHY4912	Physics Project 1	2
PHY4922	Physics Project 2	2

COURSES INDIVIDUAL TO THE DEGREES

B.S. in Physics & Computer Science

		Cr. Hrs.
MCS3723	Adv Calculus	3
MCS1514	Computer Sci 1	4
MCS2514	Computer Sci 2	4
MCS2534	Data Structures	4
MCS2613	"C"	3
MCS4813	Num Analysis 1	3
MCSXXX3	Jr/Sr Elective	3

B.S. in Physics

		Cr. Hrs.
MCS3723	Adv Calculus	3
MCS3413	Adv Eng Math	3
EEE2123	Circuits & Elect	3
EEE2111	Circuits 1 Lab	1
	Electives	11

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.



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COLLEGE OF ARTS AND SCIENCES

PHYSICS MINOR: (Minimum of 20 credit hours)

Required Courses: (12 credit hours)

PHY2413	University Physics 1	PHY2431	University Phys 2 Lab
PHY2421	University Physics 1 Lab	PHY3653	Contemporary Physics
PHY2423	University Physics 2	PHY3661	Contemporary Phys Lab

Physics Minor Electives: (Minimum of 8 credit hours)

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

PHY1173	Radiation & Environ Phys	PHY4724	Quantum Mechanics
PHY1181	Radiation & Envi Phy Lab	PHY4743	Optics, Lasers & Micro
PHY3513	Theoretical Mechanics 1	PHY4781	Opt, Lasers & Mic Lab
PHY3523	Theoretical Mechanics 2	PHY4843	Condensed Matter Phys
		PHY4991	Directed Study in Phys

GENERAL SCIENCES MINOR: (25 credit hours)

The following courses are required for a General Science minor.

BIO1213	Biology 1	BIO1223	Biology 2
BIO1221	Biology 1 Lab	BIO1231	Biology 2 Lab
CHM1213	University Chemistry 1	CHM1223	University Chemistry 2
CHM1221	Univ Chemistry 1 Lab	CHM1232	Univ Chemistry 2 Lab

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

PHY2413	University Physics 1	PHY2423	University Physics 2
PHY2421	Univ Physics 1 Lab	PHY2431	Univ Physics 2 Lab
		OR	
PHY2213	College Physics 1	PHY2223	College Physics 2
PHY221	College Physics 1 Lab	PHY2231	College Physics 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
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
PHY4843	Condensed Matter Phys
PHY4991	Directed Study in Phys
	(project 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

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

Computational Physics:

(12+13 elect = 25 credit hours)
(21 more hours for Engr majors)

PHY3513	Theoretical Mechanics 1
PHY3523	Theoretical Mechanics 2
PHY4724	Quantum Mechanics
PHY4743	Optics, Lasers & Micro

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 Munevar (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 FINANCIAL 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*

HRM3013 ORGANIZATIONAL BEHAVIOR

Prerequisite: *Management students: MGT2013; all other students: Junior standing.* Behavior of and interaction between individuals, small groups, and organizations. Understanding and use of behavioral concepts for the purpose of enhancing personal effectiveness and productivity in organizations. Lect. 3 hrs. *3 hours credit*

HRM3023 PERSONNEL/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 application 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*

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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 the

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, MKT3013. 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

MKT3043 LOGISTICS MANAGEMENT

Prerequisite: MKT3053 is preferred. The flow of materials within an individual firm and between a firm and its suppliers and customers. The system's view of the logistic functions of transportation, inventory control, materials acquisition and handling, warehousing, order processing, protective packaging, facility location and design, and the analysis and impact of customer service within the system. 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

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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

Prerequisite: COM2103. 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

COM3463 COLLABORATIVE COMMUNICATION

Prerequisite: COM2113 or instructor's permission. Intensive examination of small group communication focusing on the role and procedures of groups in the

professional world. Group theory, power structure, teamwork, critical analysis, leadership styles, and problem solving. Lect. 3 hrs. 3 hours credit

COM3473 DOCUMENT DESIGN

Prerequisite: COM2103. Emphasis on layout and design of technical documents, documents for publication, presentation support materials, and electronic media. Lect. 3 hrs. 3 hours credit

COM3483 PRESENTATION MEDIA

Prerequisite: COM2103, Co-requisite: COM2113. The systematic design, production, and use of presentation media. Emphasis on developing business-oriented presentations using posters, overhead transparencies, slides, crystal display, and multimedia. 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

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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

LLT1223 WORLD MASTERPIECES 2

Prerequisite: COM1103. A continuation of World Masterpieces 1. Works of the Neoclassical, Romantic, Modern, and Post-Modern eras in Europe and North

America, as well as those from Asia, Africa, and Latin America. Works selected may include poetry, drama, fiction, the visual arts, 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

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LLT2923 SPANISH 2

Prerequisite: LLT2913. Continuation of Spanish vocabulary and grammar, with oral and written work. Aspects of Hispanic culture and civilization. Lect. 3 hrs. *3 hours credit*

LLT3113 ENGLISH LITERATURE TO 1800

Prerequisite: LLT1223. 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*

LLT3123 ENGLISH LITERATURE 1800-1914

Prerequisite: LLT1223. Continues the survey of English literature. The first half emphasizes the poetry of the 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*

LLT3213 AMERICAN LITERATURE TO 1900

Prerequisite: LLT1223. Critical study of significant American writing. Works are selected for literary merit and to reveal developments in American culture from the early English settlers' arrival to the 20th century. Lect. 3 hrs. *3 hours credit*

LLT3223 AMERICAN LITERATURE: 1900 TO PRESENT

Prerequisite: LLT1223. Great American essays, short stories, poetry, plays, and novels and their historical and cultural influences. Lect. 3 hrs. *3 hours credit*

LLT3513 THE NOVEL

Prerequisite: LLT1223. 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*

LLT3523 WOMEN IN LITERATURE

Prerequisite: LLT1223. 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*

LLT3533 CONTEMPORARY LITERATURE

Prerequisite: LLT1223. A study of contemporary world literature presented within a social, cultural, and political context. Lect. 3 hrs. *3 hours credit*

LLT3543 MODERN POETRY

Prerequisite LLT1223. A survey of major 20th century poets, worldwide. Aesthetic, philosophical and psychological questions form the basis for discussion and analysis. Lect. 3 hrs. *3 hours credit*

LLT3613 LITERATURE AND ART

Prerequisite: LLT1223. The close connections between literature, painting, architecture and music, and how the various arts express the spirit of the times and help to shape it. Classical, romantic, realistic, and other trends are traced. Emphasis on literary work. Lect. 3 hrs. *3 hours credit*

LLT3623 LITERATURE AND SCIENCE

Prerequisite: LLT1223. The relationship between literature and science from 1660 to the present, including literature as commentary on science. Lect. 3 hrs. *3 hours credit*



BIZON PHOTO

LLT3643 LITERATURE INTO FILM

Prerequisite: LLT1223. 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*

LLT3713 DRAMA: HISTORY AND THEORY

Prerequisite: LLT1223. 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*

LLT4113 EARLY SHAKESPEARE

Prerequisite: LLT1223. 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*

LLT4123 LATER SHAKESPEARE

Prerequisite: LLT1223. 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*

LLT4513 SEMINAR IN LITERATURE

Prerequisite: LLT1223 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*

LLT4523 CREATIVE WRITING

Prerequisite: LLT1223. 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*

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LLT4533 LITERARY CRITICISM

Prerequisite: LLT1223. 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*

LLT4634 GERMAN 3

Prerequisite: LLT4623. A continuation of German language study, with emphasis on vocabulary development, pronunciation, reading and conversational skill. Lect. 4 hrs. *4 hours credit*

LLT4644 GERMAN 4

Prerequisite: LLT4634. The translation of technical articles in chemistry, physics, or mathematics. If desired, students may also select readings from contemporary literature. Lect. 4 hrs. *4 hours credit*

LLT4734 JAPANESE 3

Prerequisite: LLT4723. Continued practice in spoken and written Japanese, with background from modern social and cultural history. Lect. 4 hrs. *4 hours credit*

LLT4744 JAPANESE 4

Prerequisite: LLT4734. 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*

LLT4833 SPANISH 3

Prerequisite: LLT2923. Review of essential grammatical structures and further training in spoken and written Spanish; introduction to Spanish literature. Lect. 3 hrs. *3 hours credit*

LLT4843 SPANISH 4

Prerequisite: LLT4833. Development of oral and written proficiency, with emphasis on business and professional use; further study of Spanish literature. Lect. 3 hrs. *3 hours credit*

LLT4903 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*

LLT4913 MYTHOLOGY

Prerequisite: LLT1223. 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*

LLT4923 MODERN WORLD LITERATURE

Prerequisite: LLT1223. Modern masterpieces of world literature and their influence on present social, cultural, and political thought. Lect. 3 hrs. *3 hours credit*

LLT4991-3 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. *1-33 hours credit*

LLT5991-3 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

SSC1113 AMERICAN FEDERAL GOVERNMENT

Prerequisite: 0. Fundamental principles underlying the American federal system of government; historical study of the U.S. Constitution; topical study of the various activities and agencies of the federal government. Lect. 3 hrs. *3 hours credit.*

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

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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 Viet Nam, 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 polity. 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 theory. 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 INTERMEDIATE MICROECONOMICS

Prerequisite: MGS1224 and either SSC2303 or SSC2323. Analysis of price and output determination, demand and cost theory, intertemporal decision-making, welfare economics, market structure and antitrust policy. 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. 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*

SSC3433 JAPANESE HISTORY AND CULTURE

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: SSC2303 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: SSC2413. 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, the

development of technology in America and the tension in Western thought between technology and philosophy. 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. 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

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

Prerequisites: 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 chairman. 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



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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

SENIOR LECTURERS:

Ghassan M. Azar
Abdul Itani

LECTURERS:

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

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.

High School Background	Expected first semester	Expected second semester
2 units Algebra 1 unit Geometry 0.5 unit Trig.	MCS1414 Calculus 1	MCS1424 Calculus 2
2 units Algebra 1 unit Geometry	MCS0093 Trig.	MCS1414 Calculus 1
1.5 units Algebra 1 unit Geometry	MCS0074 Pre-calc.	MCS1414 Calculus 1
1 unit Algebra 1 unit Geometry	MCS0054 Intermed. Algebra/Geometry	MCS0074 Pre-calc.
1 unit Algebra	MCS0054 Intermed. Algebra/Geometry	MCS0083 College Algebra

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, radical, 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*

MCS0055 ESSENTIAL ALGEBRA AND ANALYTICAL GEOMETRY

Prerequisite: MCS0035. Continuation of MCS0035 improving and extending skills in factoring, exponents, radicals. Graphing using the rectangular coordinates system. Quadratic equations, formulas, graphing. Collaborative learning, lab work and continued focus on successful study habits will be stressed. Lect. 5 hrs., Lab 3 hours *3 hours credit*

MCS0060 ALGEBRA WORKSHOP

Prerequisite: Placement or permission of department chairman. This workshop first assesses each student's level of algebraic ability and then introduces the algebraic problems to fit his/her specific needs. Problems are presented using a variety of methods, and

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*

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*

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, radian 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 and 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*

MCS1321 CALCULUS 1B

Prerequisite: Placement from MCS1414, or 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 MCS1414.) Lect. 4 hrs., *1 hour credit*

MCS1332 CALCULUS 1C

Prerequisite: Placement from MCS1414, 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: MCS1414 or MCS1332. Inverse functions, exponential and logarithmic functions, inverse trigonometric functions, hyperbolic functions, L'Hospital's rule, integration by parts, trigonometric integrals. Course covers the same material as the first 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 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*

MCS1362 CALCULUS 2C

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 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, indefinite integrals, substitutions, definite integrals, the Fundamental Theorem of Calculus, applications of integration. Lect. 4 hrs. *4 hours credit*

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MCS1424 CALCULUS 2

Prerequisite: MCS1414. Calculus of transcendental functions, l'Hospital'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 MCS1214. 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

Prerequisites: 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

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

Prerequisites: 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. 3 hours credit

MCS2524 DISCRETE MATHEMATICS

Prerequisites: MCS1514; MCS1224 or MCS1414. Logic, sets, and functions. Algorithms, the integers, and matrices. Mathematical reasoning. Basic counting techniques, permutations and 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. 3 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 pre-processor, 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 inversion 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 queuing 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*

MCS3603 JAVA

Prerequisite: MCS1514.
Introduction to Java; comparing Java to C++, Java building elements: control structures, methods, object-oriented programming, arrays and strings, inheritance, graphics programming, applets, multithreading and multimedia. Lect. 3 hrs. *3 hours credit*

MCS3613 C++

Prerequisite: MCS1142. Object-oriented programming techniques introduced through the language C++. Lect. 3 hrs. *3 hours credit*

MCS3623 UNIX SYSTEM OPERATION AND PROGRAMMING

Prerequisite: MCS1514. Unix standardization and implementations, files and directories, standard I/O library, system data files and implementations, process control, process relationship, signals, advanced I/O. Daemon processes, inter-process communication. Lect. 3 hrs. *3 hours credit*

MCS3633 INTRODUCTION TO FUNCTIONAL PROGRAMMING

Prerequisite: MCS1514. An 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*

MCS3653 COMPUTER ARCHITECTURE

Prerequisite: MCS3513. Detailed study of the organization and structure of modern computer systems. Lect. 3 hrs. *3 hours credit*

MCS3663 COMPUTER ARCHITECTURE AND ASSEMBLY PROGRAMMING

Prerequisite: MCS2514. Basic structure of computer hardware and assembly programming. Internal representations, processing unit arithmetic, memory addressing modes, stack processing, CISC, RISC. Lect. 3 hrs. *3 hours credit*

MCS3673 NETWORK SYSTEM ADMINISTRATION

Prerequisite: MCS1514.
Introduction to network systems, daemons, booting the system, policy, NFS, NIS, serial lines, disks, kernel configurations, Internet, USEnet, www, FTP, electronic mail, resource management, performance analysis, accounting, system logging, security, backups, hackers and padlocks. Lect. 3 hrs. *3 hours credit*

MCS3723 ADVANCED CALCULUS

Prerequisite: MCS2423. Line and surface integrals, Green's Theorem, Stokes' Theorem, Divergence Theorem. Power series solutions of differential equations, Legendre's equation, Frobenius method, Bessel functions, orthogonality. Lect. 3 hrs. *3 hours credit*

MCS3733 PARTIAL DIFFERENTIAL EQUATIONS

Prerequisite: MCS2423.
Orthogonality, orthonormal bases, Fourier series, Fourier integral. Solution techniques for first and second order equations. Solutions of homogeneous and non-homogeneous boundary value problems. Sturm-Liouville theory. Lect. 3 hrs. *3 hours credit*

MCS3743 COMPLEX ANALYSIS

Prerequisite: MCS2423. Complex numbers. DeMoivre's Theorem. 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*

MCS4613 COMPUTER NETWORKS

Prerequisite: MCS3663.
Transmission media, local asynchronous communication (RS232), long distance communication, packets, frames, error detection, LAN technologies, network topologies, hardware addressing, LAN wiring, physical topologies, interface hardware, extending LANs, fiber modems, repeaters, bridges and switches, WAN topologies and routing. 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*

COLLEGE OF ARTS AND SCIENCES

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 chairman. By arrangement. *1 hour credit*

MCS4982 DIRECTED STUDY IN MATH/COMPUTER SCIENCE

Prerequisite: Permission of department chairman. By arrangement. *2 hours credit*

MCS4983 DIRECTED STUDY IN MATH/COMPUTER SCIENCE

Prerequisite: Permission of department chairman. 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. An advanced course in Java programming. Advanced multi-threading, multimedia and graphics. Networking and RMI. Database access with Java. Java Beans and EJB. Servlets and JSP. Multi-tier application development using CORBA. Java and embedded systems. JINI. Current topics in Java technology. 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.

Building and using ActiveX controls. Using MFC to build COM clients and servers. Using automation. Using ATL to create COM clients and servers. Programming with DCOM. Introduction to CORBA. Lect. 3 hrs. *3 hours credit*

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: MCS5233 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.

Introduction to Windows programming. Principles of human-computer interaction. Graphical user interface programming. Event driven programming. Developing help systems. Evaluation techniques. Windows programming environments such as MFC and UNIX. Introduction to various RAD tools. Lect. 3 hrs. *3 hours credit*

COLLEGE OF ARTS AND SCIENCES

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: MCS5213. 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

MCS5233 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

MCS5503 INTELLIGENT SYSTEMS

Prerequisite: MCS2534. Introduction to artificial intelligence and computational intelligence. Problem solving by searching. Optimization methods. Knowledge representation and reasoning. Machine learning. Multi-agent systems. Pattern recognition. Introduction to

evolutionary computation. Introduction to artificial neural networks. Fuzzy logic. 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

COOPERATIVE EDUCATION IN MATH/COMPUTER SCIENCE

MCS3001 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



COLLEGE OF ARTS AND SCIENCES

DEPARTMENT OF NATURAL SCIENCES

PROFESSORS:

Charles M. Chambers
Jerry L. Crist
Walter K. Dean
George W. Mach
Richard E. Marburger, emeritus
Richard E. Michel, emeritus
Daniel W. Mioduszewski
Maria J. Vaz

ASSOCIATE PROFESSORS:

William G. Madden (chairperson)
Marilyn V. Rands
Scott D. Schneider
Anthony F. Sky

SENIOR LECTURER:

Mitchell T. Kamlay

LECTURERS:

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

BIOLOGY

BIO1213 BIOLOGY 1

Prerequisite: One high school science course. The basic structure, chemistry and energetics of a cell. Mechanisms of inheritance, gene structure and function, and Mendelian genetics. Origin and history of life, mechanisms of evolution, and introduction to systematics. Lect. 3 hrs. 3 hours credit

BIO1221 BIOLOGY 1 LABORATORY

Prerequisite: One high school science lab. *Co-requisite:* BIO1213. Experiments to support BIO1213, including the use of the microscope. Lab. 2 hrs. 1 hour credit

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: One high school science lab. *Co-requisite:* 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: BIO1221. *Co-requisite:* BIO2313. 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 interac-

tion 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

CHM1221 UNIVERSITY CHEMISTRY 1 LABORATORY

Co-requisite: CHM1213. Laboratory experiments supporting topics covered in CHM1213. Lab 3 hrs biweekly. 1 hour 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 cations. 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 macroscale laboratory techniques and syntheses, utilizing gas chromatographic and spectroscopic techniques together with qualitative organic analysis. Lab 6 hrs. 2 hours credit

COLLEGE OF ARTS AND SCIENCES

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

Note: CHM3423 and CHM3434 are independent courses and can be taken in either order.

CHM3442 PHYSICAL-ANALYTICAL LABORATORY 1

Prerequisite: CHM2352. *Co-requisites:* CHM3423, CHM3434. Laboratory experiments supporting topics covered in CHM3423 and CHM3434. Lab 6 hrs. 2 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

CHM4542 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, CHM3434. 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

COLLEGE OF ARTS AND SCIENCES

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



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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 only receive credit for 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, Newtons Laws, and d-c circuits. (For engineering technology students only.) Lect. 3 hrs. 3 hours credit

PHY1063 TECHNICAL PHYSICS I

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

COLLEGE OF ARTS AND SCIENCES

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*

PHY1161 PHYSICS SEMINAR

Prerequisite: 0. Discussions, written and oral presentations of current topics in Physics. Lect. 1 hr. *1 hour 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

Prerequisites: MCS1003 or equivalent computer experience. Co-requisite: PHY2213. Introductory laboratory covering experiments to complement College Physics 1. Lab. 2 hrs. *1 hour credit*

PHY2223 COLLEGE PHYSICS 2

Prerequisites: 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: MCS2414 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: PHY2431. *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

Prerequisites: 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: *Permission of department chair.* Research or special studies under the direction of a staff member of an experimental or theoretical nature. *1, 2, or 3 hours credit*

COOPERATIVE EDUCATION IN SCIENCE

These cooperative education courses presume that the student is doing a parallel program where the student works half-time while taking classes at Lawrence Tech. It is possible to do a full-time co-op by taking two of these courses in sequence during one semester (such as the summer). The completion of two courses is equivalent to one credit-hour. A co-op certificate is given when all six of the courses are successfully completed.

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.*

COLLEGE OF ENGINEERING



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Ext. 2500

Associate Dean:

Richard S. Maslowski, E98,
Ext. 2500

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General Motors Corp.

COLLEGE OF ENGINEERING

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 curricula provide 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-

nology and management into one program. It provides a strong, well-balanced combination of technology and management courses to produce a graduate who is uniquely suited to function effectively in both technical and managerial capacities, and thus follows the University's long tradition of emphasizing strong skill development by combining theory and practice.

Since the academic backgrounds of entering students vary widely, Lawrence Tech is in an especially advantageous position to provide academic and career advising on an individualized basis to assist students in fulfilling their academic and career foundation goals. Each student is assigned an academic advisor upon entering the program and is able to contact this advisor to be certain that the path they are pursuing is leading to the desired goal.

Course work for the technology management degree differs in some notable ways from the B.S.I.M. program and this is reflected in specific technology management majors. The technology management degree has a more rigorous science requirement and a technology, natural science, or engineering core which sets it apart from the B.S.I.M. degree.

The Bachelor of Science in *construction management* (B.S.C.M.) degree is new for Fall of 2000. The B.S.C.M. is intended for the professional who is employed in the construction industry. The program is designed for the person who works full-time. This does not preclude a full-time student from actively pursuing a degree, but the majority of

the classes for this program are offered in the evening. A student who has completed the Associate of Science in construction engineering technology can transfer the full program into the B.S.C.M.

The B.S.C.M. is designed to the specifications of the American Council of Construction Education. It is supported by the Associated General Contractors, Greater Detroit Chapter.

ACADEMIC AND INDUSTRIAL PARTNERSHIPS IN EDUCATION

Associate of Science in Manufacturing Engineering/Technology (Greenfield Coalition program):

The Greenfield Coalition for New Manufacturing Education has developed an innovative college-level manufacturing engineering curriculum, integrating experiential learning in the degree program. The curriculum offers associate and baccalaureate degrees in manufacturing engineering and technology. The Coalition consists of:

- Five major universities: Lawrence Tech, Lehigh University, University of Detroit Mercy, University of Michigan, and Wayne State University.
- Six corporate partners: DaimlerChrysler Corporation, Cincinnati Milicron, Detroit Diesel, EDS, Ford Motor Company, and General Motors Corporation.
- The Society of Manufacturing Engineers
- Focus: HOPE

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 Manager, 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.

COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

TOTAL SEMESTER CREDIT HOURS: 131

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
ECE1103	CE Comp App Lab	3
MCS1414	Calculus 1	4
CHM1213	Univ Chemistry 1	3
CHM1221	Univ Chem 1 Lab	1
ECE1012	Civil Engr Perspect	2
17		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
LLT1213	World Masterpcs 1	3
SSC2413	Found Am Exper	3
MCS1424	Calculus 2	4
GLG1103	Geology	3
ECE1413	CE Materials	3
16		

SOPHOMORE YEAR

COM2103	Tech & Prof Comm	3
LLT1223	World Masterpcs 2	3
ECE1013	Surv & Land Meas	3
MCS2414	Calculus 3	4
PHY2413	Univ Physics 1	3
PHY2421	Univ Physics 1 Lab	1
17		

EGE2013	Statics	3
EEE2123	Circuits & Elec	3
MCS2423	Diff Equations	3
PHY2423	Univ Physics 2	3
PHY2431	Univ Physics 2 Lab	1
SSC2423	Devel Am Exper	3
16		

JUNIOR YEAR

SSC2303	Basic Economics	3
MCS3403	Prob & Statistics	3
ECE3523	Hydromechanics	3
EGE3012	Engr Cost Analysis	2
EME3013	Mech of Materials	3
	Engr Sci Elective	3
17		

ECE3213	Construction Engr	3
ECE3324	Environ Engr 1	4
ECE3424	Geotechnical Engr	4
ECE3723	Theory of Structures	3
ECE3823	Transportation Engr	3
17		

SENIOR YEAR

ECE4021	CE Design Proj 1	1
ECE4051	Ethics & Prof Issues	1
ECE4544	Hydraulic Engr	4
ECE4743	Concrete Design	3
	Civil Engr Electives	6
15		

ECE4033	CE Design Proj 2	3
ECE4761	Struc Des Test Lab	1
LLT/SSC	Jr/Sr Elective	3
	Civil Engr Electives	9
16		

BACHELOR OF SCIENCE IN CIVIL ENGINEERING - Continued

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.

Technical Elective	Design Credits
ECE4243 Civil Engr Management Principles	0
ECE4263 Cost Estimating, Bidding & Contracting	0
ECE4343 Environmental Engineering 2	1
ECE4563 Hydrology	1
ECE4733 Advanced Structural Analysis	0
ECE4363 Environmental Design	3
ECE4443 Foundation Engineering	3
ECE4623 Project Design, Planning & Scheduling	1
ECE4753 Steel Design	3
ECE4843 Highway Engineering	3

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



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COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

TOTAL SEMESTER CREDIT HOURS: 131

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
CHM1213	Univ Chemistry 1	3
CHM1221	Univ Chem 1 Lab	1
EGE1012	Intro to Engr	2
16		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
LLT1213	World Masterpcs 1	3
SSC2413	Found Am Exper	3
MCS1424	Calculus 2	4
MCS1514	Computer Sci 1	4
EGE1102	Engr Comp App Lab	2
16		

SOPHOMORE YEAR

LLT1223	World Masterpcs 2	3
MCS2414	Calculus 3	3
MCS2523	Discrete Math	4
PHY2413	Univ Physics 1	3
PHY2421	Univ Physics 1 Lab	1
EEE2213	Digital Electronics	4
EEE2211	Digital Elect Lab	1
18		

MCS2423	Diff Equations	3
MCS2514	Computer Sci 2	4
PHY2423	Univ Physics 2	3
PHY2431	Univ Physics 2 Lab	1
EEE2114	Circuits 1	4
EEE2111	Circuits 1 Lab	1
16		

JUNIOR YEAR

COM2103	Tech & Prof Comm	3
MCS2534	Data Structures	4
MCS3403	Prob & Statistics	3
SSC2423	Devel Amer Exp	3
EEE3123	Circuits 2	3
16		

EEE3233	Microprocessors	3
EEE3231	Microproc Lab	1
EEE3313	Electronics	3
EEE3311	Electronics Lab	1
EEE3223	Advanced Digital	3
EEE3221	Adv Digital Lab	1
MCSXXX3	Comp Sci Tech Elec	3
SSC2303	Basic Economics	3
18		

SENIOR YEAR

MCS4663	Operating Systems	3
EEE4513	Control Systems	3
EEE4511	Control Syst Lab	1
EEE4832	ECE Projects 1	2
EEE4XX3	Comp Eng Elective	3
EEE4XX1	Comp Eng Lab	1
EEE4XX3	EE Tech Elective	3
16		

EEE4253	Computer Archit	3
EEE4251	Computer Arch Lab	1
EEE4842	ECE Projects 2	2
EEE4XX3	EE Tech Elective	3
MCS4XX3	CS Tech Elective	3
LLT/SSC	Jr/Sr Elective	3
15		

* 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

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
CHM1213	Univ Chemistry 1	3
CHM1221	Univ Chem 1 Lab	1
EGE1012	Intro to Engr	2
16		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
LLT1213	World Masterpcs 1	3
SSC2413	Found Am Exper	3
MCS1424	Calculus 2	4
EGE1023	Engr Materials	3
EGE1102	Engr Comp App Lab	2
15		

SOPHOMORE YEAR

COM2103	Tech & Prof Comm	3
LLT1223	World Masterpcs 2	3
MCS2414	Calculus 3	4
PHY2413	Univ Physics 1	3
PHY2421	Univ Physics 1 Lab	1
EEE2213	Digital Electronics	3
EEE2211	Digital Elect Lab	1
18		

MCS2423	Diff Equations	3
PHY2423	Univ Physics 2	3
PHY2431	Univ Physics 2 Lab	1
SSC2423	Devel Am Exper	3
EGE2013	Statics	3
EEE2114	Circuits 1	4
EEE2111	Circuits 1 Lab	1
18		

JUNIOR YEAR

MCS3403	Prob & Statistics	3
MCS3413	Adv Engr Math	3
SSC2303	Basic Economics	3
EME4613	Intro Thermal Syst	3
EEE3123	Circuits 2	3
EEE3121	Circuits 2 Lab	1
16		

EEE3233	Microprocessors	3
EEE3231	Microproc Lab	1
EEE3313	Electronics	3
EEE3311	Electronics Lab	1
EEE3414	Electrom Fields	4
EEEXX3	EE Concentr #1	3
EEEXX1	EE Lab	1
16		

SENIOR YEAR

EEE3422	Adv Comp Appl Lab	2
EEE4513	Control Systems	3
EEE4511	Control Syst Lab	1
EEE4812	EE Projects 1	2
EEE4XX3	EE Concentr #2	3
EEE4XX1	EE Lab	1
EEE4XX3	EE Tech Elective	3
15		

EEE4423	Comm Systems	3
EEE4XX3	EE Concentr #3	3
EEE4XX3	EE Tech Elective	3
EEE4822	EE Projects 2	2
EEE4XX1	EE Lab	1
LLT/SSC	Jr/Sr Elective	3
EGE3012	Engr Cost Analysis	2
17		

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	Electronics Engineering	Electrical & Power Engineering
EEE3223 Adv Digital	EEE3223 Adv Digital	EEE3513 Intro Electr Sys
EEE4253 Comp Arch 1	EEE4323 Adv Electr	EEE4133 Electr Machines
EEE4XX3 Comp Elective	EEE4713 Optoelectronics	EEE4543 Process Control

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.

COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

TOTAL SEMESTER CREDIT HOURS: 131

FRESHMAN YEAR

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
COM1103	English Comp	3
MCS1142	Intro to C	2
MCS1414	Calculus 1	4
CHM1213	Univ Chemistry 1	3
CHM1221	Univ Chem 1 Lab	1
EGE1012	Intro to Engr	2
16		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
LLT1213	World Masterpcs 1	3
SSC2413	Found Amer Exp	3
MCS1424	Calculus 2	4
EGE1023	Engr Materials	3
EGE1102	Engr Comp App Lab	2
SSC2303	Basic Economics	3
18		

SOPHOMORE YEAR

COM2103	Tech & Prof Com	3
LLT1223	World Masterpcs 2	3
MCS2414	Calculus 3	4
PHY2413	Univ Physics 1	3
PHY2421	Univ Phys 1 Lab	1
EME2012	ME Graphics	2
16		

SSC2423	Devel Am Exper	3
MCS2423	Diff Equations	3
PHY2423	Univ Physics 2	3
PHY2431	Univ Physics Lab	1
EGE2013	Statics	3
EME3023	Mfg Processes	3
EME2011	Engr Matls Lab	1
17		

JUNIOR YEAR

MCS3403	Prob & Statistics	3
MCS3413	Adv Engr Math	3
EEE2123	Circuits & Elect	3
EGE3003	Thermodynamics	3
EME3013	Mech of Materials	3
EME3043	Dynamics	3
18		

EME3011	Intro Engr Proj	1
EEE3153	Elect Mach Ctrl	3
EEE3161	Intro to EE Lab	1
EGE3012	Engr Cost Anal	2
EME3024	Fluid Mechanics	4
EME3034	Kin & Dyn Mach	4
EME4003	Des Mach Elem	3
18		

SENIOR YEAR

EME4212	Engr Projects 1	2
EME4402	Mechanics Lab	2
EME4012	Comp Aided Engr	2
EME4013	Heat Transfer	3
EME4XX3*	Tech Elective	3
EME4XX3*	Tech Elective	3
15		

EME4222	Engr Projects 2	2
EME4412	Thermal Sci Lab	2
EME4XX3*	Tech Elective	3
EME4XX3*	Tech Elective	3
LLT/SSC3	Jr/Sr Elective	3
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

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
MCS1214	Math Anal 1	4
PSC1113	Phys Science 1	3
COM1103	English Comp	3
11		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
MCS1224	Math Anal 2	4
PSC1123	Phy Science 2	3
PSC1131	Phy Science Lab	1
LLT1213	World Masterpcs 1	3
11		

THIRD SEMESTER

MCS2113	Statistics 1	3
LLT1223	World Masterpcs 2	3
SSC2313	Macroeconomics	3
9		

FOURTH SEMESTER

MCS2123	Statistics 2	3
COM2103	Tech & Prof Com	3
SSC2323	Microeconomics	3
9		

FIFTH SEMESTER

SSC2413	Found Am Exper	3
MGT2203	Mgt & Supervision	3
ACC2013	Principles Acctg 1	3
9		

SIXTH SEMESTER

SSC2423	Devel Am Exper	3
MGT2113	Intro Bus Law	3
ACC2023	Principles Acctg 2	3
9		

SEVENTH SEMESTER

HRM3013	Org Behavior	3
MKT3013	Principles Mkt	3
FIN3103	Intro Finance Mgt	3
9		

EIGHTH SEMESTER

INT3023	Info Tech Inaugural	3
TOM3113	Operations Mgt	3
COM3103	Adv Prof Comm	3
9		

NINTH SEMESTER

XXX3	Op Mgt Elect	3
XXX3	Op Mgt Elect	3
XXX3	Indust Elect	3
9		

TENTH SEMESTER

XXX3	Op Mgt Elect	3
XXX3	Indust Elect	3
MGT4213	Strategic Mgt	3
9		

ELEVENTH SEMESTER

XXX3	Indust Elect	3
XXX3	Indust Elect	3
XXX3	Indust Elect	3
9		

TWELFTH SEMESTER

LLT/SSC3	Jr/Sr Hum Elect	3
XXX3	Open Elective	3
XXX3	Open Elective	3
9		

THIRTEENTH SEMESTER

XXX3	Open Elective	3
XXX3	Open Elective	3
XXX3	Open Elective	3
9		

Note: Progress may be accelerated by completing additional courses in any semester including summer.

B.S.I.M. UPPER DIVISION REQUIREMENTS

Operations Management Electives

HRM3023	Personnel/HR Mgt	3
HRM4013	Empl/Mgt Relations	3
HRM4033	HR Prob & Policies	3
MKT3043	Logistics Mgt	3
TOM4123	Adv Oper Mgt	3
TOM4093	Ind Study in Op Mgt	3
TIE2123	Project Mgt	3

Industrial Electives

EGE1012	Intro to Engineering 2	2
MKT3073	Technical Sales	3
TIE2013	Prod & Work Meas	3
TIE2033	Ergonomics & Saf	3
TIE2063	Manufac Proc 1	3
TIE2093	Metrology & QC	3
TIE2153	Manufac Proc 2	3
TME1023	Tech Graphics	3

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.

COLLEGE OF ENGINEERING

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

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
CHM1154	Intro Chem Prin	4
MCS1023	Tech Comp Appl	3
8		

THIRD SEMESTER

LLT1213	World Masterpcs 1	3
MCS1123	Tech Math 2	3
PHY1083	Tech Physics 2	3
PHY1101	Tech Physics Lab	1
10		

FIFTH SEMESTER

MCS2113	Statistics 1	3
SSC2313	Macroeconomics	3
XXX3	Tech Course	3
9		

SEVENTH SEMESTER

MGT2203	Mgt & Supervision	3
SSC2413	Found Amer Exper	3
XXX3	Tech Course	3
9		

NINTH SEMESTER

ACC2103	Principles Acctg	3
COM2103	Tech & Prof Comm	3
XXX3	Tech Course	3
9		

ELEVENTH SEMESTER

FIN3103	Intro Finance Mgt	3
HRM3013	Org Behavior	3
XXX3	Tech Course	3
9		

THIRTEENTH SEMESTER

LLT/SSC3	Jr/Sr Hum Elective	3
MKT3103	Prin of Marketing	3
XXX2	Tech Course	2
8		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM1103	English Comp	3
MCS1113	Tech Math 1	3
PHY1063	Tech Physics 1	3
PHY1100	Tech Physics Lab	0
9		

FOURTH SEMESTER

LLT1223	World Masterpcs 2	3
MCS2313	Tech Calculus	3
MGT2113	Intro Business Law	3
9		

SIXTH SEMESTER

MCS2123	Statistics 2	3
SSC2323	Microeconomics	3
XXX3	Tech Course	3
9		

EIGHTH SEMESTER

INT3023	Info Tech Inaugural	3
SSC2423	Develop Amer Exp	3
XXX3	Tech Course	3
9		

TENTH SEMESTER

ACC2023	Principles Acctg	3
TOM3113	Operations Mgt	3
XXX3	Tech Course	3
9		

TWELFTH SEMESTER

COM3103	Adv Prof Comm	3
TIE2103	Prod & Wrk Meas	3
6		

FOURTEENTH SEMESTER

MGT4213	Strategic Mgt	3
TIE4115	Senior Projects	5
8		

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
LLT1213	World Masterpcs 1
LLT1223	World Masterpcs 2
HRM3013	Organizational Behavr
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

CONSTRUCTION CORE

TCE2123	Estimating
TCE4XX3	Constr Safety
TIE2123	Project Management
TIE4115	Senior Project

CONST & MGT ELECTIVES

(11 credit hours required)	
ECE4263	Cost Est, Bid & Cont
ECE4623	Proj Plan,Des & Sched
TOM3113	Operations Mgt
TCE4XX2	Construction Equip
TCE4XX2	Value Engineering
TCE4XX3	Hwy Design & Est
TIE2013	Prod & Work Measure

Note: Progress may be accelerated by completing additional courses in any semester including summer.



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COLLEGE OF ENGINEERING

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)

MCS1514	Computer Science 1	4
MIS3023	Bus Sys Anal & Des	3
TIE2013	Prod & Work Meas	3

Plus at least seven courses from the following*:

ACC4023	EDP Audit and Controls	3
MCS2514	Computer Science 2	4
MCS2524	Discrete Math	4
MCS2534	Data Structures	4
MCS3513	Assembler	3
MCS3543	Database Systems	3
MCS3653	Computer Architecture	3
MCS4623	Software Engineering	3
MIS4013	Sys Develop Project	3
MIS4023	Data Comm Systems	3

B.S.T.M. MANUFACTURING TECHNOLOGY MAJOR REQUIREMENTS (10 courses)

TEE3103	AC/DC Circuits	3
TIE2063	Manufacturing Proc 1	3
TIE2013	Prod & Work Meas	3
TIE2143	Manufacturing Proc 2	3
TIE4115	Senior Project	5
TME2143	Materials 1	3
TME3113	Engineering Mechanics	3

Plus at least three courses from the following*:

ACC3033	Cost Accounting	3
FIN4023	Fin Anal & Planning	3
HRM4013	Employ/Mgt Relations	3
MKT3043	Logistics Management	3
TIE2033	Ergonomics & Safety	3
TIE2093	Metrl & Quality Control	3
TIE2123	Project Management	3
TME1023	Tech Graphics	3
TOM4123	Adv Operations Mgt	3

B.S.T.M. CONSTRUCTION TECHNOLOGY MAJOR REQUIREMENTS (10 courses)

TCE2013	Arch Graphics	3
TCE2143	Specs & Regulations	3
TIE2013	Prod & Work Meas	3
TIE2123	Project Management	3
TIE4115	Senior Project	5

Plus at least five courses from the following*:

TCE2013	Construction Tech 1	3
TCE2033	Soils	3
TCE2053	Construction Tech 2	3
TCE2073	Surveying	3
TCE2093	Structures	3
TCE2123	Estimating	3
TME2013	Statics	3
TME2033	Mechanics of Materials	3

B.S.T.M. MECHANICAL TECHNOLOGY MAJOR REQUIREMENTS (13 courses)

TIE2173	Automatic Control Systems	3
TIE2013	Prod & Work Meas	3
TIE2063	Mfg Processes 1	3
TIE4115	Senior Project	5
TME1023	Tech Graphics	3
TME2013	Statics	3
TME2033	Mech of Materials	3
TME2053	Dynamics	3
TME2073	Thermodynamics	3
TME2123	Fluids	3
TME2143	Materials 1	3
TME2163	Computer Graphics	3
TME2213	Mechanical Design	3

B.S.T.M. ELECTRICAL TECHNOLOGY MAJOR REQUIREMENTS (10 courses)

TEE1023	Circuits 1	3
TEE2013	Circuits 2	3
TEE2033	Electronics 1	3
TEE2053	Electronics 2	3
TEE2073	Electrical Drawing	3
TIE2013	Prod & Work Meas	3
TIE4115	Senior Project	5

Plus at least three courses from the following*:

TEE2093	Electronics 3	3
TEE2123	Microprocessors	3
TEE2143	Electrical Machines	3
TEE2163	Electronic Comm	3
TEE2183	Indust Electronics	3
TIE2123	Project Mgt	3

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.

COLLEGE OF ENGINEERING

ASSOCIATE OF SCIENCE IN CONSTRUCTION ENGINEERING TECHNOLOGY

TOTAL SEMESTER CREDIT HOURS: 65

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
MCS1023	Tech Comp Appl	3
MCS1113	Tech Math 1	3
SSC2303	Basic Economics	3
10		

THIRD SEMESTER

MCS2313	Tech Calc	3
PHY1083	Tech Phys 2	3
PHY1101	Tech Phys Lab 2	1
TCE1023	Arch Graphics	3
10		

FIFTH SEMESTER

TCE2013	Construct Tech 1	3
TCE2033	Soils	3
TCE2073	Surveying	3
9		

SEVENTH SEMESTER

TCE2093	Structures	3
TCE2123	Estimating	3
TCE2143	Specs & Reg	3
9		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM1103	English Comp	3
MCS1123	Tech Math 2	3
PHY1063	Tech Phys 1	3
PHY1100	Tech Phys Lab 1	0
9		

FOURTH SEMESTER

COM2103	Tech & Prof Comm	3
MCS2323	Applied Diff Eq*	3
TME2013	Statics	3
9		

SIXTH SEMESTER

TCE2053	Const Tech 2	3
TME2033	Mech of Materials	3
TIE2123	Project Mgt	3
9		

**or Statistical Methods (MCS2023)*

ASSOCIATE OF SCIENCE IN ELECTRICAL ENGINEERING TECHNOLOGY

TOTAL SEMESTER CREDIT HOURS: 65

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
MCS1113	Tech Math 1	3
MCS1023	Tech Comp Appl	3
SSC2303	Basic Economics	3
10		

THIRD SEMESTER

MCS2313	Tech Calc	3
PHY1083	Tech Phys 2	3
PHY1011	Tech Phys Lab 2	1
TEE1023	Circuits 1	3
10		

FIFTH SEMESTER

COM2103	Tech & Prof Comm	3
TEE2053	Electronics 2	3
TEE2073	Electrical Drawing	3
9		

SEVENTH SEMESTER

TEE2163	Electronic Comm	3
TEE2183	Industrial Electron	3
TIE2123	Project Mgt	3
9		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM1103	English Comp	3
MCS1123	Tech Math 2	3
PHY1063	Tech Phys 1	3
PHY1100	Tech Phys Lab 1	0
9		

FOURTH SEMESTER

MCS2323	Applied Diff Eq*	3
TEE2013	Circuits 2	3
TEE2033	Electronics 1	3
9		

SIXTH SEMESTER

TEE2093	Electronics 3	3
TEE2123	Microprocessors	3
TEE2143	Electrical Machine	3
9		

**or Statistical Methods (MCS2023)*

ASSOCIATE OF SCIENCE IN MANUFACTURING ENGINEERING TECHNOLOGY

TOTAL SEMESTER CREDIT HOURS: 65

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
MCS1023	Tech Comp Appl	3
MCS1113	Tech Math 1	3
TME1023	Tech Graphics	3
10		

THIRD SEMESTER

SSC2303	Basic Economics	3
MCS2313	Tech Calc	3
PHY1083	Tech Physics 2	3
PHY1101	Tech Phys Lab 2	1
10		

FIFTH SEMESTER

TIE2013	Prod & Work Meas	3
TME2013	Statics	3
TIE2063	Mfg Processes 1	3
9		

SEVENTH SEMESTER

TEE2173	Automatic Ctrl Sys	3
TIE2153	Mfg Processes 2	3
TIE2123	Project Mgt	3
9		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM1103	English Comp	3
MCS1123	Tech Math 2	3
PHY1063	Tech Phys 1	3
PHY1100	Tech Phys Lab 1	0
9		

FOURTH SEMESTER

COM2103	Tech & Prof Comm	3
MCS2023	Statistical Meth*	3
TME2143	Materials I	3
9		

SIXTH SEMESTER

TME2033	Mech of Materials	3
TIE2093	Metrol & Qual Ctrl	3
TIE2163	Engr Econ & Acct	3
9		

**or Applied Differential Equations (MCS2323)*

ASSOCIATE OF SCIENCE IN MECHANICAL ENGINEERING TECHNOLOGY

TOTAL SEMESTER CREDIT HOURS: 65

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
COM1001	University Seminar	1
MCS1023	Tech Comp Appl	3
MCS1113	Tech Math 1	3
TME1023	Tech Graphics	3
10		

THIRD SEMESTER

SSC2303	Basic Economics	3
MSC2313	Tech Calc	3
PHY1083	Tech Phys 2	3
PHY1101	Tech Phys Lab 2	1
10		

FIFTH SEMESTER

TME2033	Mech of Matls	3
TME2053	Dynamics	3
TME2073	Thermodynamics	3
9		

SEVENTH SEMESTER

TEE2173	Automatic Ctrl Sys	3
TME2163	Computer Graphics	3
TME2213	Mechanical Design	3
9		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
COM1103	English Comp	3
MCS1123	Tech Math 2	3
PHY1063	Tech Phys 1	3
PHY1100	Tech Phys Lab 1	0
9		

FOURTH SEMESTER

COM2103	Tech & Prof Comm	3
MCS2323	Applied Diff Eq*	3
TME2013	Statics	3
9		

SIXTH SEMESTER

TIE2063	Mfg Processes 1	3
TME2123	Fluids	3
TME2143	Materials 1	3
9		

**or Statistical Methods (MCS2023)*

ENGINEERING TECHNOLOGY ADVISOR:

Contact the Technology Department, ext. 2060, Room E179, for your assigned faculty advisor.

COLLEGE OF ENGINEERING

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

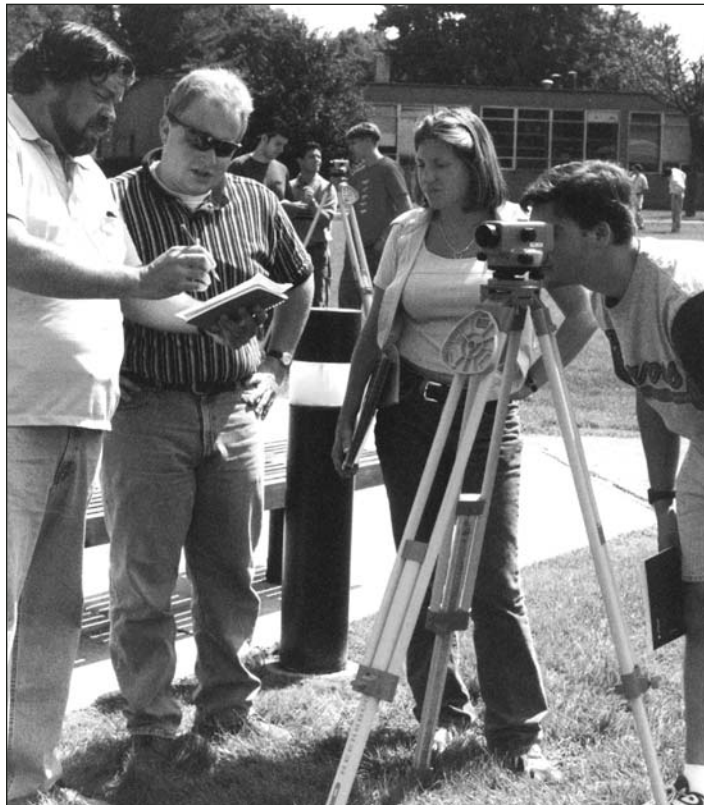
PHY1063 Technical Physics 1
 PHY1100 Technical Physics Laboratory 1
 PHY1083 Technical Physics 2
 PHY1101 Technical Physics Laboratory 2

Total Science Credits: 7

SOCIAL SCIENCE

SSC2303 Basic Economics

Total Social Science Credits: 3



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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
 TME2033 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*
 TME2013 Statics
 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.

COLLEGE OF ENGINEERING

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)

LLTXXX3 Elective
LLTXXX3 Elective

SOCIAL SCIENCES (9 CREDIT HOURS)

SSCXXX3 Elective
SSC2303 Basic Economics
SSC1213 Introductory Psychology or SSCXXX3 Elective

JUNIOR/SENIOR ELECTIVE (3 CREDIT HOURS)

LLT3XX3 or LLT4XX3 or SSC3XX3 or SSC4XX3

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.



COLLEGE OF ENGINEERING

ASSOCIATE OF SCIENCE IN MANUFACTURING ENGINEERING/ TECHNOLOGY

For students in the Greenfield Coalition Program *only*

TOTAL SEMESTER CREDIT HOURS: 69

FIRST SEMESTER

Course No.	Subject	Cr. Hrs.
GCO0990	Orientation	0
GCF1101	Tech Graphics	1
GCL1011-1031	Engl Comp	3
GCM1011-1051	Technical Math	5
9		

SECOND SEMESTER

Course No.	Subject	Cr. Hrs.
GCF1011-1031	Comp in Engr	3
GCM2111-2141	Calculus	4
GCT1211	Fnd of Measure	1
8		

THIRD SEMESTER

Course No.	Subject	Cr. Hrs.
GCS2111-2131	Mechanophys	3
GCC1011-1021	Basic Chem	2
GCF1133	Design Graphics	3
8		

FOURTH SEMESTER

Course No.	Subject	Cr. Hrs.
GCS2141	Mech II	1
GCC2011-2021	Chem/Matls Sci	2
GCL1211-1241	Psych/Soc	4
GCM2412,2431	Stat Methods	3
10		

FIFTH SEMESTER

Course No.	Subject	Cr. Hrs.
GCL2614	Comp Pol & Eco	4
GCT2011-2021	Engr Materials	2
GCS2311-2331	Electroscience	3
9		

SIXTH SEMESTER

Course No.	Subject	Cr. Hrs.
GCT1111-1121	Machine Proc	2
GCT1221	Instrument	1
GCE2411-2421	Manufact Plan	2
GCL2011-2031	Comm in Mfg	3
8		

SEVENTH SEMESTER

Course No.	Subject	Cr. Hrs.
GCT2313,2341	Manufact Syst	4
GCT2451-2461	Ehtics & Indus	2
GCT2211-2221	Elect Machines	2
GCS2211	Thermoscience	1
9		

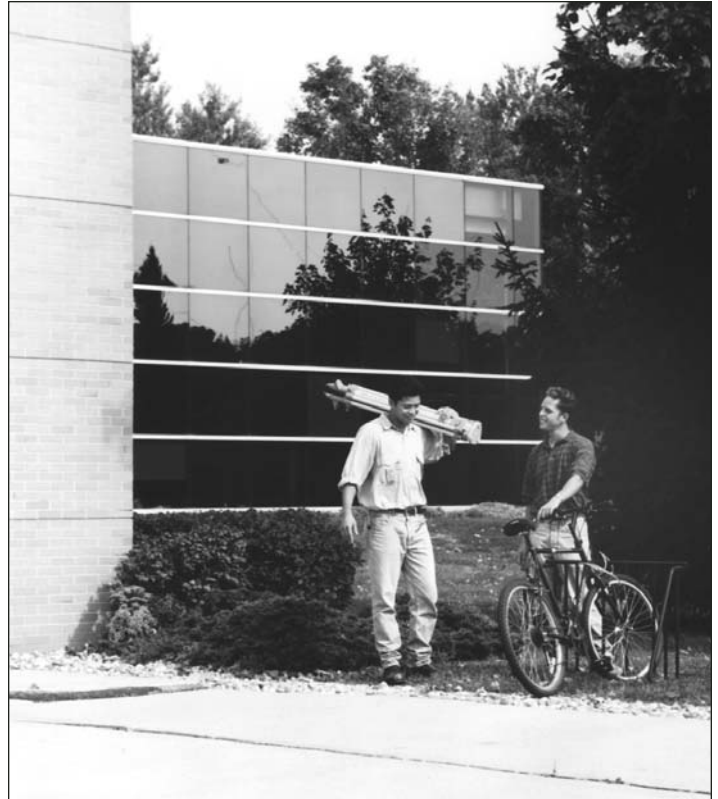
EIGHTH SEMESTER

Course No.	Subject	Cr. Hrs.
GCT2511	Design Project	1
GCE2261	Control Syst	1
GCE2461-2471	Engr Econ	2
GCT2111-2121	Manu Process	2
GCT2181-2191	Tool Design	2
8		

MANUFACTURING ENGINEERING/TECHNOLOGY (Greenfield Coalition)

ADVISOR:

Sabah H. Abro, ext. 2069, VAX Username: SABAH, room E179



SINGER PHOTO

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

ECE3213 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

ECE3324 ENVIRONMENTAL ENGINEERING 1

Prerequisites: CHM1213 and ECE3523. Environmental quality objectives, standards and regulations, basic concepts of water purification; drinking water quality standards and the design of unit operations and processes in water treatment. Water plant waste management. Water quality management in rivers and lakes. Lect. 3 hrs., Lab. 2 hrs., Lab fee. 4 hours credit

ECE3424 GEOTECHNICAL ENGINEERING

Prerequisite: EME3013. Soil origin and formation; physical properties of soils, soil composition and identification; permeability and effective stresses; soil compaction; consolidation and settlement of soils; shear strength; and bearing capacity. Lect. 3 hrs., Lab. 2 hrs., Lab fee. 4 hours credit

ECE3523 HYDROMECHANICS

Prerequisite: EGE2013. Hydrostatics; application of principles of conservation of mass, energy and momentum; dimensional analysis and modeling; pipe flow; surface and form drag; irrotational flow and numerical techniques. 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: EGE3012 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

ECE4033 CE DESIGN PROJECT 2

Prerequisite: Senior standing and permission of department chairman. Open-ended design problems for seniors, 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. Lab fee. 3 hours 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

ECE4243 CIVIL ENGINEERING MANAGEMENT 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: ECE3523 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 alternatives. 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. In-depth study of a particular civil engineering topic. 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. Material of a specialized nature that is of interest to both faculty and students. *Hours of credit designated by last digit in course number.*

ECE5213 PROJECT MANAGEMENT TECHNIQUES

Prerequisite: Graduate standing or permission of department chairman. The wide range of management techniques in civil infrastructure projects. Focus on construction scheduling, budgeting, cash flow, and quality management. Current software used throughout. Actual civil infrastructure projects used include highway, airport, water and wastewater facilities. Lect. 3 hrs., *3 hours credit*

ECE5233 ADVANCED CONSTRUCTION TECHNIQUES AND METHODS

Prerequisite: Graduate standing or permission of department chairman. 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 chairman. 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 chairman. 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

ECE5723 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

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

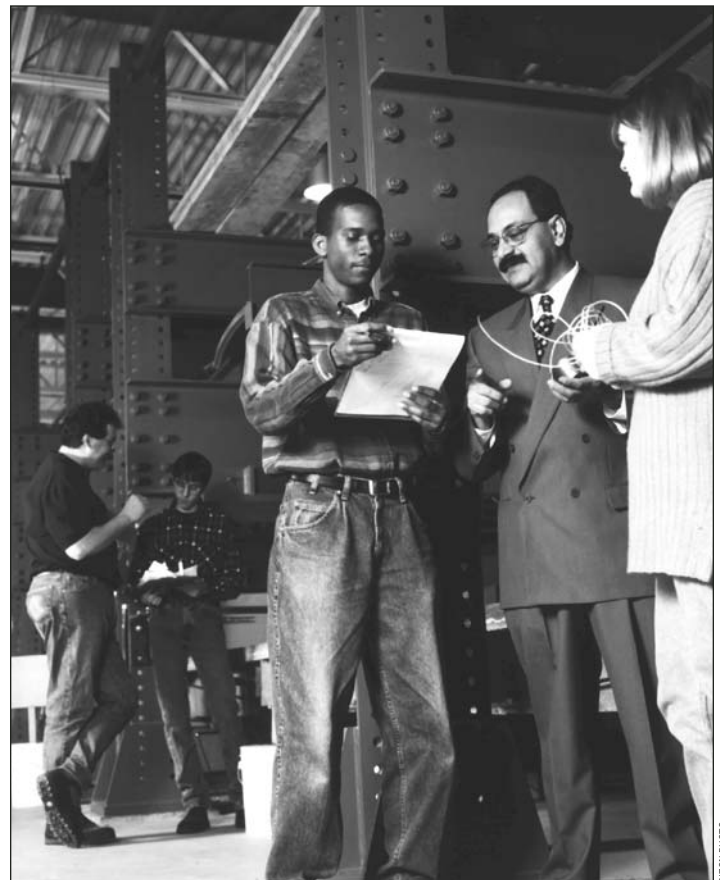
ECE5763 ADVANCED COMPOSITE MATERIALS AND THEIR USES IN STRUCTURES

Prerequisite: ECE3723 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

ECE5923 SPECIAL TOPICS IN CIVIL ENGINEERING

Prerequisite: Graduate standing or permission of department chairperson. Topic or topics of current interest in the field of civil engineering. Course content subject to change each time the course is offered. Lect. 3 hrs. 3 hours credit



DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

PROFESSORS:

H. Robert Farrah
 Ronald C. Foster (interim chair)
 Robert D. Hatch, emeritus
 Richard S. Maslowski
 Kelvin Shih
 Lewis N. Walker

ASSOCIATE PROFESSORS:

Lisa M. Anneberg
 Michael J. Cloud
 Nabil Hachem, emeritus
 Mohammad H. Hassan
 Richard R. Johnston
 William B. Kolasa

LECTURERS:

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

EEE2114 CIRCUITS I

Co-requisites: MCS2423, PHY2423. Voltage current, power. Kirchoffs laws, Ohms law, resistance, independent and dependent sources, operational amplifiers. Formulation and solution of network equations, Mathcad, Spice, linearity and superposition, Thevenins theorem, maximum power transfer. Capacitance, inductance, mutual inductance. Sinusoidal steady state analysis, AC power, three phase systems. Transfer functions, frequency response, Bode diagrams, filters. First order transient responses. Lect. 4 hrs. *4 hours credit*

EEE2111 CIRCUITS 1 LAB

Co-requisite: EEE2114. Safety. Proper use of test equipment. Measurement of resistances, measurement of constant voltages and currents, instrument loading, error analysis. Design of voltage and current dividers, T and PI attenuators. Measurement of power, source resistance, Thevenin parameters. Op amps, dependent sources, wave-forms, first and second order transient circuits. Balanced bridges, strain gauges, thermistors, thermocouples. Lab. 2 hrs. *2 hours credit*

EEE2123 CIRCUITS AND ELECTRONICS

(For non-EE majors)
Co-requisites: MCS2423, PHY2423. Fundamental laws. Circuit parameters, elementary network theory. Forced and transient response, semi-conductor devices, electronic circuits, digital logic and counting circuits. Lect. 3 hrs. *3 hours credit*

EEE2211 DIGITAL ELECTRONICS LAB

Co-requisite: EEE2213. Lab experiments dealing with the concepts from EEE2213, Digital Electronics. Experiments include studies of various logic gates, and the design of various combinational and sequential circuits. Lab. 2 hrs., Lab fee. *1 hour credit*

EEE2213 DIGITAL ELECTRONICS

Prerequisite: Junior standing. Logic gates, minimization and design of combinational circuits, MSI and LSI circuits and applications, sequential circuit analysis and design. Lect. 3 hrs. *3 hours credit*

EEE3121 CIRCUITS 2 LAB

Prerequisite: EEE2111, Co-requisite: EEE3123. Measurement of magnitude and phase of sinusoidal signals, measurement of magnitude and phase response as a function of frequency. Superposition, Thevenin, and Norton analyses in the frequency domain. Differentiators, integrators, constant current sources, transformers. Interface and filter design. Parasitic inductance, capacitance, and resistance. Lab 2 hrs. *1 hour credit*

EEE3123 CIRCUITS 2

Prerequisite: EEE2114. Ramp, step, and impulse functions. Second order transient responses, differential equations, transfer functions, convolution, impulse response. Laplace transforms, Fourier analysis, two-port networks. Lect. 3 hrs. *3 hours credit*

EEE3153 ELECTRICAL MACHINES AND CONTROLS

(For non-EE majors)
Prerequisite: EE2123. Magnetic circuits, DC and AC machines, transformers, linear systems, models and equations, time and frequency response of control systems, root locus, Bode plots, stability, control system design methods, sinusoidal steady state, three phase systems. Lect. 3 hrs. *3 hours credit*

EEE3161 INTRODUCTION TO EE LABS (For non-EE majors)

Co-requisite: EEE3153. Electrical and electronic measurements, op-amps, diodes and rectifier circuits, bipolar junction transistors, field effect transistors, amplifiers, digital electronics. Physical system modeling, satisfying design and performance criteria. Fundamentals of DC and AC machine operations. Lab 2 hrs. *1 hour credit*

EEE3221 ADVANCED DIGITAL ELECTRONICS LAB

Prerequisite: EEE2211, Co-requisite: EEE3223. Laboratory experiments covering the principles studied in EEE3223. PLDs, I/O and peripheral circuitry, image processing, digital signal processing, and other related topics. Lab. 2 hrs., Lab fee. *1 hour credit*

EEE3223 ADVANCED DIGITAL ELECTRONICS

Prerequisite: EEE2213. Implementation of state machines using programmable logic devices (PLDs), design of computer hardware and related I/O circuitry using hardware description language VHDL. Memory control unit, graphics and image processing, digital signal processing, bus interface circuitry, communication devices, peripheral hardware design, and industrial control applications. Lect. 3 hrs. *3 hours credit*

EEE3231 MICROPROCESSORS LAB

Co-requisite: EEE3233. Study and design of assembly language and programming, hardware emulation, clock design and interface, input/output and memory design and interface. Design of a turn-key microcomputer system. Lab. 2 hrs. *1 hour credit*

EEE3233 MICROPROCESSORS

Prerequisite: EEE2213, EEE2114. Architecture, timing, instruction set, memory and input/output techniques for various microprocessors, design of a microcomputer system. 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. Computation 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, chop 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. Program 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 ARCHITECTURE I

Prerequisite: EEE3233. Analysis of state machines. CPU design with consideration for data flow, I/O, and ALU. Basic computer architecture classifications. Memory systems including memory cache and virtual memory design. Pipeline design techniques. RISC and CISC computer architectures. Selected 8, 16, 32, and 64 bit microprocessor chips. Lect. 3 hrs. *3 hours 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 addresses; networking 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 and 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, EEE3123. 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 Maxwells 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, Grafset, 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, 4-20mH current loop and multiplexing. Lect. 3 hrs. *3 hours credit*

EEE4613 SOLID STATE TECHNOLOGY

Prerequisites: EEE3313, EEE3414. Semiconductor materials and characteristics. Energy band diagrams. Conduction principles. Diodes, transistors, FETS, MOSFETS, memory. Manufacturing techniques for ICs. Design of IC chip layouts. Future trends in microminiaturization. Lect. 3 hrs. *3 hours credit*

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 EE curriculum. Students in each of the project groups must present an oral and written project proposal early in the term, a written mid-term progress report, and a formal written and oral presentation at the end of the term. *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 mid-term 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

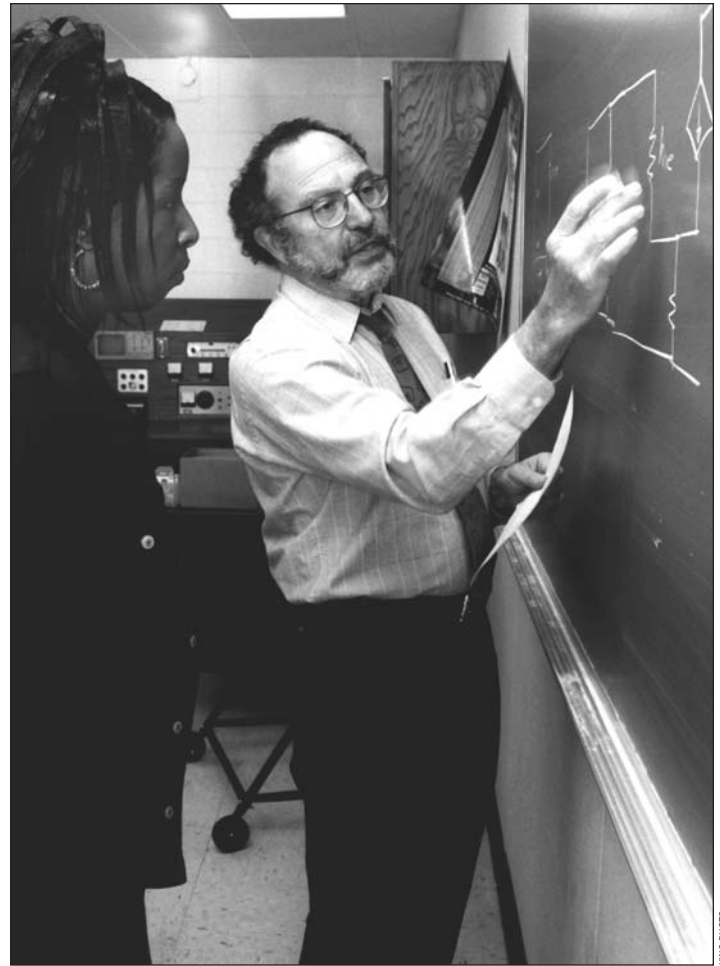
Prerequisite: EEE3313. System design using AI; LISP programming language, intelligent vision and imaging systems, data base search methods, logic and deduction using predicate calculus, expert system design, applications to robotics. Lect. 3 hrs. *3 hours credit*

EEE5563 INTERFACING 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-customs designs, application-specific integrated circuit design, and system design. Lect. 3 hrs. *3 hours credit*



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EEE5633 OPTICAL SYSTEM ENGINEERING

Prerequisites: EEE3414, EEE3313. Review of Maxwells equations, and the electromagnetic theory of light. Fundamentals of geometrical and physical optics. Simple optical components. Gaussian beams. Fourier transforming properties of lenses. Properties of laser beams, LEDs, and detectors. Design of emitter and detector circuits. Design of free space and optical fiber systems. Lect. 3 hrs. *3 hours credit*

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.
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's 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*



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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*

TEE2053 ELECTRONICS 2

Prerequisites: TEE2013, TEE2033. Feedback principles, operational amplifiers, differential amplifiers, analog devices, integrator and differentiator devices, wave shaping, oscillators, multivibrators and pulse generation. 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 mathematic 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*

TEE2013 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*

TEE2033 ERGONOMICS AND SAFETY

Prerequisites: MCS2313, COM1103. Fundamentals and basic principles of ergonomics emphasizing static and functional anthropometry, vision, illumination and visual displays; audition, noise and auditory displays; anatomy of movement and biomechanics; physical force effects and handtool design. Changing attitudes of government and industry regarding safety, development of workmans compensation, OSHA, safety standards. Accident investigation, hazards, their elimination and control. Lect. 3 hrs. *3 hours credit*

TIE2063 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*

TIE2093 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*

TIE2123 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*

TME1023 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 epicycle gear trains, displacement, velocity and acceleration analysis of mechanisms. Lect. 3 hrs. *3 hours credit*



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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

flow, system losses, velocity profiles, fluid flow. Compressible flow analysis. The computer is used for problem solving and analysis. Lect. 3 hrs. *3 hours credit*

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. Metallographic techniques, sample treatment testing techniques. Lect. 3 hrs., Lab. 1 hr. *3 hours credit*

TOM3113 OPERATIONS MANAGEMENT

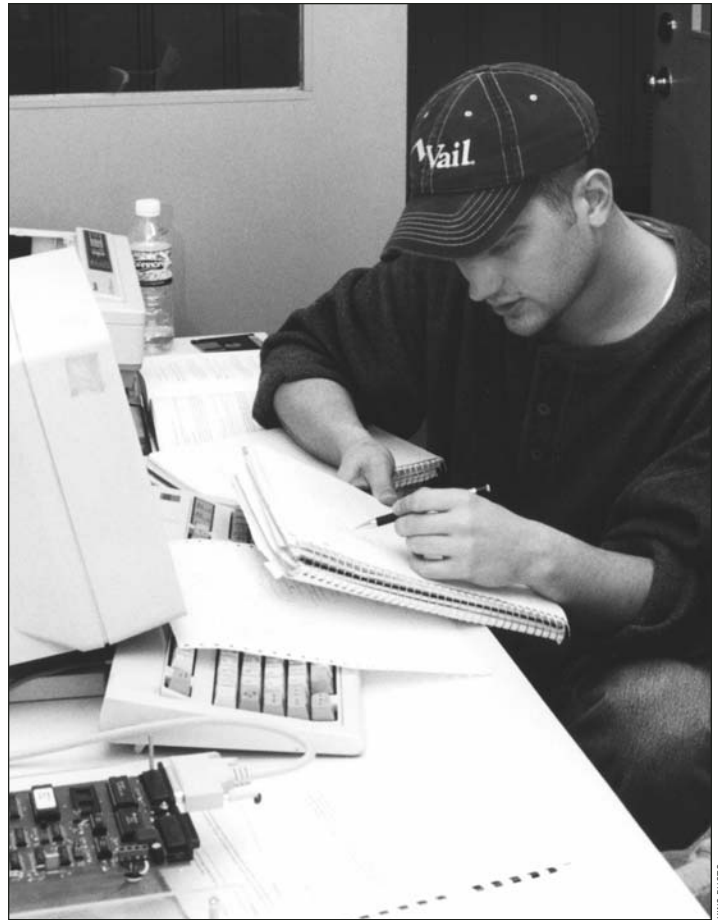
Prerequisites: MGT2203 and MCS2113 or MCS2023. An overview of production functions in both manufacturing and service organizations. Forecasting, capacity planning, product and service system design, aggregate planning, inventory and project management, and quality assurance. Lect. 3 hrs. *3 hours credit*

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*

TOM4123 ADVANCED OPERATIONS MANAGEMENT

Prerequisite: TOM3113. Specific operating decisions with emphasis in the areas of location planning, facilities layout, material requirements planning, scheduling, just-in-time production, learning curve, work systems design, and process control. Lect. 3 hrs. *3 hours credit*



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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*

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-

tions in physical condition and chemical composition on the properties of metals, plastics, elastomers, glass, cements, etc. Lect. 3 hrs. 3 hours credit.

EGE1102 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.

EME2011 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.

EME2012 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.

EME3011 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.

EME3013 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.

EME3023 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 KINEMATICS & 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, psychometrics. Design of heat exchangers. Lect. 3 hrs. *3 hours credit.*

EME4103 ADVANCED MANUFACTURING PROCESSES

Prerequisite: EME3023. Competitive aspects and economics of manufacturing. Analysis of sheet metal fabrication. Analysis for bulk deformation processes. Modeling and optimization of machining processes. Modeling of non-traditional machining processes. Performance and analysis of machine tools. Computer controlled machining processes. Development and utilization of computer-aided process planning systems. Lect. 3 hrs. *3 hours credit.*

EME4113 THERMODYNAMICS II

Prerequisite: EGE3003. The concept of availability, refrigeration cycles, mixtures and psychometrics, 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 hours. *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

charts, ISO 9000/QS 9000 and process improvement. 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.

Psychometrics, humidification, heating, cooling, fluid flow and pressure losses, and system design. Lect. 3 hrs. *3 hours credit*

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. Behavior, processing and applications of plastics; how fundamental characteristics of polymers influence the properties of plastics. Emphasis on the design and manufacture of plastic parts. Lect. 3 hrs. *3 hours credit*

EME5123 OPTIMIZATION OF MANUFACTURING SYSTEMS

Prerequisite: EME3023. Principles necessary to apply modern optimization techniques to manufacturing applications.

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*

GREENFIELD COALITION

PROGRAM MANAGER:
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.

GCC1011-1021 BASIC CHEMISTRY I-II

Prerequisite: GCM1011. 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

Prerequisites: GCM1011-1041. *Co-requisite:* 2141. Chemical equilibria and chemical kinetics. Methods for solving complex equilibrium problems; gas phase equilibria; solution equilibria and heterogeneous equilibria. Includes electrochemistry, corrosion and degradation of materials and advanced topics in kinetics. *2 one-credit courses taken in succession.*

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.*

GCE2261 CONTROL ELEMENTS IN MANUFACTURING SYSTEMS

Prerequisite: GCT1221. An overview of control systems and a study of the application of sensors and actuators in control systems, digital logic, and programmable logic controllers. *1 credit hour*

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 INTRODUCTI ON 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 FUNDAMEN TALS 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. Theories of communication, persuasion, organizational communication, effective communication opportunities and obstacles, and the ethics of communications. Methods of communications, project proposal and technical presentations and an introduction into traditional and non-traditional media presentations. *3 one-credit courses taken in succession.*

GCL2614 COMPARATIVE POLITICS AND ECONOMICS

Prerequisite: 0. Globalization issues. Integration of social, political, and economic knowledge for a manufacturing company's expansion in the global market. Modular topics include team building, research strategies, project planning, cultural understanding, comparative political systems, economic development models and comparative economic systems, and political and economic integration methods. *4 credit hours*

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*

GCS2311-2331 ELECTROSCIENCE

Prerequisite: GCM1011. Fundamental principles of electrostatics, the concepts of DC-analysis and the study of the functioning of the many devices and everyday applications employing the principles of electromagnetism and/or inductors and capacitors. *3 one-credit courses taken in succession.*

GCT1111-1121 MACHINING PROCESSES I-II

Prerequisites: GCF111-1131, GCM1011-1031. Introduction to basic machine tool operations and material removal technology. Topics include process technology associated with material removal, cutting tool mechanics, mathematical process relations, cutting fluids and process planning. *2 one-credit courses taken in succession.*

GCT1211 FOUNDATIONS OF MEASUREMENTS

Prerequisite: 0. Presentation of terminology, procedures, and capabilities of devices used in the field of measurement; measurement statistics. *1 credit hour*

GCT1221 INSTRUMENTATION

Prerequisite: 0. Instrumentation used in manufacturing environments. Overview of control system terms, discrete/binary signals, multiplexed signals, analog to digital conversion, and a study of programmable logic controllers. *1 credit hour*

GCT2011-2021 ENGINEERING MATERIALS I-II

Prerequisites: GCM1011, GCM1021. Developing an understanding of the many types of materials that are used in our technological society. Metals, ceramics, polymers, composites, materials selection and materials for manufacturing. A project is completed on a workpiece of the student's choice. *2 one-credit courses taken in succession.*

GCT2111-2121 MANUFACTURING PROCESSES I-II

Prerequisites: GCT1211, GTC1221, GCT2021. Introduction into the issues of product quality and tolerances, manufacturing processes for casting and how the various methods influence secondary operations such as machining and metal forming processes. Manufacturing joining processes which include various types of welding, brazing and soldering and a study of the heat flow in the work place. *2 one-credit courses taken in succession.*

GCT2181-2191 TOOL DESIGN I-II

Prerequisites: GCM1021, GCF1131, 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

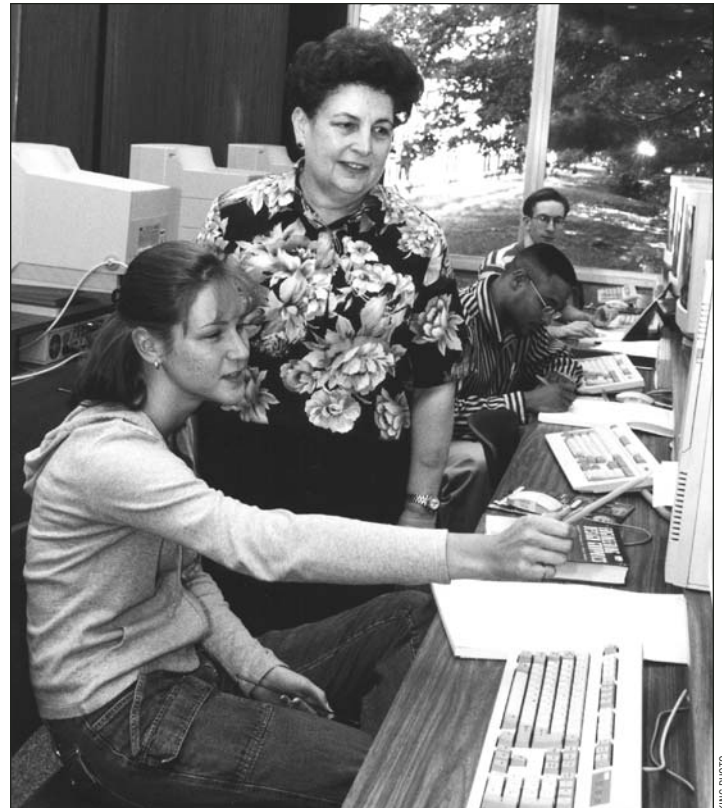
Prerequisite: 0. To be developed. *2 one-credit courses taken in succession.*

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*



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COLLEGE OF MANAGEMENT

**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

**College of Management Advisory
Board:**

BARTON DENNIS, MSIO'98
buyer, worldwide purchasing,
General Motors Corporation

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Global Engineering, Inc.

ADAM GUTOWSKI, MBA'92

president,
Williams & Lipton Co.

MARY ANNE MERUCCI, MBA'98

quality analyst,
Ford Motor Co.

TRACY WILLIAMSON, MBA'92

standard strategist,
Ford Motor Co.

GLENN YEAGER, MBA'98

new products team manager
Valeo Sylvania

KIM ZIOMEK-MATTE, MBA'95

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

COLLEGE OF MANAGEMENT

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.



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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

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**

For further information on these programs, see the *Graduate Catalog*.

COLLEGE OF MANAGEMENT

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*

INT3023 INFORMATION TECHNOLOGY INAUGURAL

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*



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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*

INT4203 SYSTEMS ANALYSIS AND DESIGN

Prerequisite: INT3023. Developing an information system from concept to implementation. Various system development methodology techniques and introduction to the system development life cycle. Special emphasis on developing good communication skills between users, clients, team members and others that are associated with the project. 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*

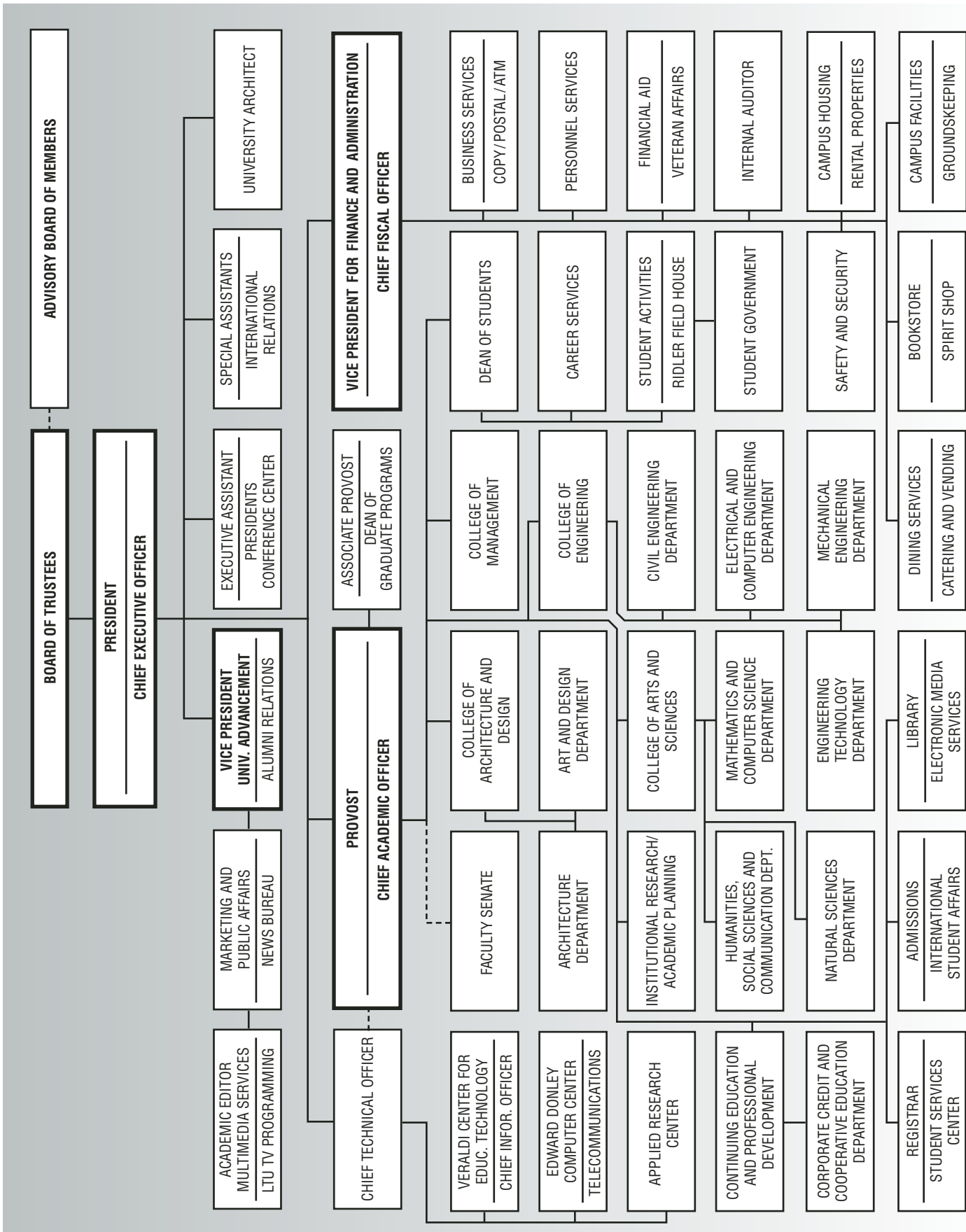
INT4506 and INT4524 PROFESSIONAL TRAINING - NON EVALUATED

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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Douglas G. DelGrosso, ME'84

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Operations, Lear Corp.

Howard B. Padgham

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Power Train, DaimlerChrysler Corp.

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Vice President, Advanced Vehicle Engineering,
DaimlerChrysler Corp.

Raymond R. Khan, EE'70

Senior Vice President and CIO,
Blue Cross/Blue Shield of Michigan

EX OFFICIO

Charles M. Chambers

President and Chief Executive Officer,
Lawrence Technological University

ADVISORY MEMBERS OF THE CORPORATION

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Chairman of the Board, Cross and Trecker Corporation (ret.)

Richard H. Cummings

Senior Vice Chairman, National Bank of Detroit and
NBD Bancorp (ret.)

Edward Donley, ME'43

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.

William D. Innes, ME'53

Executive Vice President, Ford Motor Company (ret.)

Ben C. Maibach, Jr.

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. Veryser
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

Vice President, Finance and Administration,

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

Provost and Chief Academic Officer..... Lewis N. Walker

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. Rohrbach
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. 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

Faculty Senate

William S. Allen
Suresh Bansal*
Mohammad H. Hassan
Barry W. Knister
Michael J. Merscher
Srikant Raghavan
Steven Rost

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. Kouskoulas
Dean of Graduate Programs
(ex-officio)

Library

Gary R. Cocozzoli*
Richard Johnston
Barbara A. Kouskoulas

Student Activities

Alan McLaughlin*
Bruce J. Annett, Jr.
Thomas A. Lackey
Student Government President

Student Discipline

Aydan Ilter
Laura L. Lisiecki
Pamela Lowry

**Chairperson*

FACULTY ROSTER



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.

JAVAD ABDOLLAHI-ALIBEIK, M.S., 1993, Ph.D., 1994, University of Michigan. *Lecturer in Mathematics and Computer Science, 2000, 2000.*

JAMES ABERNETHY, AIA; RA; B.Ar., 1964, University of Detroit Mercy; M.U.P., 1972, Wayne State University. *Professor of Architecture, 1974, 1985.*

SABAH H. ABRO, B.S., 1971, University of Baghdad, M.S., 1980, University of Wales, Ph.D., 1987, Universite de Louvain. Focus: HOPE. *College Professor of Engineering Technology, 2000, 2000.*

PARVIZ AHMADI, B.S.E.E., B.S.Eng.Ma., 1982, M.S.E.E., 1985, University of Michigan. Chrysler Corporation. *Lecturer in Electrical Engineering, 1984, 1984.*

WILLIAM S. ALLEN, ASLA; RLA; B.L.A., 1971, University of Michigan. *Professor of Architecture, 1973, 1995.*

NEAL E. ALPNER, B.A., 1973, M.A., 1975, Wayne State University. Catholic Central High School. *Lecturer in Mathematics and Computer Science, 1977, 1977.*

DAW R. AL-WERFALLI, B.S.M.E., 1972, Al-Fateh University; M.S.Textiles, 1978, Georgia Institute of Technology; M.E.Mfg., 1981, D.E., 1989, University of Detroit Mercy. *Associate Professor of Mechanical Engineering, 1990, 1996.*

KUSSIY K. ALYASS, B.S., 1977, University of Baghdad, Ph.D., 1984, Wayne State University. *Lecturer in Mathematics and Computer Science, 2000, 2000.*

THOMAS ANDERSON, B.A., 1980, M.A., 1988, Ph.D., 1991, Wayne State University. *Lecturer in Humanities, 1998, 1998.*

DONALD ANDREWS, A.B., Math, Physics, 1959, Eastern Michigan University. *Lecturer in Mathematics and Computer Science, 1987, 1987.*

LISA M. ANNEBERG, PE; B.S., 1979, University of Michigan; M.S., 1983, Ph.D., 1991, Wayne State University. *Associate Professor of Electrical Engineering, 1991, 1995.*

LAVETTA APPLEBY, B.S., 1991, M.S., 1996, Michigan State University. *Lecturer in Chemistry, 1996, 1996.*

FRANCIS J. ARLINGHAUS, B.S., 1962, University of Detroit Mercy, Ph.D., Massachusetts Institute of Technology. General Motors (retired). *Lecturer in Mathematics and Computer Science, 1984, 1984.*

WILLIAM C. ARLINGHAUS, B.S., 1964, University of Detroit Mercy; Ph.D., 1979, Wayne State University. *Professor of Mathematics and Computer Science, 1985, 1991.*

NAJI ARWASHAN, B.S.E., 1987, University of Damascus, M.S.E., 1988, Ecole Nationale des Ponts et Chaussees, Ph.D., 1992, University of Michigan. LTV Steel. *Lecturer in Civil Engineering, 1999, 1999.*

FACULTY ROSTER

ALLISON ARSCOTT, ASLA; RLA; B.A. Eng., 1966, M.L.A., 1976, University of Michigan. Allison Arscott Landscape Planning and Design. *Lecturer in Architecture, 1993, 1993.*

FRANK X. ARVAN, RA; AIA; B.S.Arch., 1978, Lawrence Technological University, M.Arch., 1982, Columbia University. *Lecturer in Architecture, 1999, 1999.*

JOSEPH R. ASIK, B.S., 1959, Case Institute of Technology; M.S., 1961, Ph.D., 1966, University of Illinois. Ford Motor Company. *Lecturer in Electrical and Mechanical Engineering, 1978, 1978.*

ROGER E. AVIE, B.S.I.M., 1968, Lawrence Technological University. Specialty Products. *Lecturer in Humanities, 1999, 1999.*

GLADYS M. AVILES, B.S., 1984, University of Puerto Rico; Ph.D., 1989, Wayne State University. *Lecturer in Chemistry, 1998, 1998.*

GHOSSAN M. AZAR, B.A., 1982, M.S., 1986, Ph.D., 1992, Wayne State University. *Senior Lecturer in Computer Science, 2000, 2000.*

EUGENE R. BAKER, NSID; B.F.A., 1961, Cleveland Institute of Art. ERB Associates, Inc. *Lecturer in Architecture, 1981, 1981.*

ANTHONY L. BAN, B.S.Ar., 1972, Lawrence Technological University, Schonsheck, Inc. *Lecturer in Civil Engineering, 1996, 1996.*

SURESH C. BANSAL, P.E.; B.S.M.E., 1963, Punjab University; M.S.M.E., 1968, Ph.D., 1977, Wayne State University. *College Professor of Mechanical Engineering, 1997, 1997.*

SULEIMAN BARADA, B.S., 1975, Detroit Institute of Technology; M.S., 1980, Ph.D., 1996, Wayne State University. *Lecturer in Mathematics and Computer Science and Electrical Engineering, 1990, 1990.*

DAVID L. BARCZYS, AIA; RA; B.S.Arch, 1980, University of Detroit Mercy, M.Arch., 1984, University of Illinois. *Lecturer in Architecture, 1999, 1999.*

JASON M. BARRETT, B.A., 1993, University of Michigan, M.A., 1994, University of Virginia. *Lecturer in Humanities, 1999, 1999.*

THOMAS M. BARRIE, RA; B.A., 1978, University of North Carolina; M.Ar., 1981, Virginia Polytechnic Institute and State University; M.Phil., 1993, University of Manchester, England. *Associate Professor of Architecture, 1993, 1997.*

DEBORAH I. BAUER, B.S.C.E., 1994, Lawrence Technological University, M.S.C.E., 1996, University of Iowa. Wade-Trim. *Lecturer in Civil Engineering, 1999, 1999.*

GLEN A. BAUER, B.S., 1977, M.A., 1979, Wayne State University. *Associate Professor of Mathematics and Computer Science, 1982, 1993.*

ALI BAZOUN, B.S., 1981, M.S., 1983, Wayne State University. Chrysler Corporation. *Lecturer in Electrical Engineering and Mathematics and Computer Science, 1991, 1991.*

DAVID R. BERGMAN, B.S., 1992, M.S., 1994, Ph.D., 1999, University of Illinois at Chicago. *Senior Lecturer of Physics, 1999, 1999.*

LESTER BERMAN, PE; B.S.C.E., 1970, M.S.C.E., 1978, Wayne State University. U.S. Department of Housing and Urban Development. *Lecturer in Architecture, 1979, 1979.*

HAROLD BINDER, AIA; RA; A.B.Ar., 1948, Harvard University; M.Ar., 1951, Harvard Graduate School of Design. *Lecturer in Architecture, 1991, 1991.*

DAVID E. BINDSCHADLER, B.S., 1970, Ohio State University, M.S., 1973, Indiana State University, Ph.D., 1976, Indiana University. *Associate Professor of Mathematics and Computer Science, 1999, 1999.*

RONALD G. BLEVINS, B.S.I.M., 1981, Lawrence Technological University. New Departure Hyatt. *Lecturer in Engineering Technology, 1993, 1993.*

JEFFREY P. BOES, B.S.Arch., 1983, B. Arch., 1984, Lawrence Technological University. TMP Associates. *Lecturer in Art and Design, 2000, 2000.*

ANDREW S. BORCHERS, B.A., 1980, Kettering University; M.B.A., 1982, Vanderbilt University; DBA, 1996, Nova Southeastern University. *College Professor in Management, 1990, 1997.*

LAWRENCE J. BRENTON, B.A., 1967, University of Pennsylvania; Ph.D., 1974, University of Washington. Wayne State University. *Lecturer in Mathematics and Computer Science, 1978, 1978.*

GERALD A. BREUER, B.B.A., 1975, M.B.A., 1977, University of Michigan. *Lecturer in Management, 1983, 1983.*

LUDDER BRINKER, A.M., 1979, Clark University, M.A., 1980, M.A., 1981, University of Freiburg, Ph.D., 1991, University of Massachusetts. *Lecturer in Humanities, 1998, 1998.*

BRITA BROOKES, AUA; CNU; NTHP; B.S.Arch., 1990, University of Michigan, M.Arch., 1994, Harvard Grad School of Design. *Lecturer in Architecture, 1999, 1999.*

SCOTT BUCK, B.S., 1989, Lawrence Technological University; B.S.C.S., 1992, Wayne State University. U.S. Army Tacom. *Lecturer in Engineering Technology, 1994, 1994.*

JUDY L. BURKE, B.S., 1975, Villanova University, M.A., 1978, University of Michigan. *Lecturer in Humanities, 2000, 2000.*

SARAH H. BYERS, B.S.I.A., 1965, University of Cincinnati. *Lecturer in Architecture and Art and Design, 1996, 1996.*

KAREN A. CAMERON, B.A., 1981, Wayne State University, M.S., 1983, Purdue University. General Motors. *Lecturer in Humanities, 1999, 1999.*

SANDRA A. CARDEW, B.F.A., 1989, M.F.A., 1992, Wayne State University. *Lecturer in Art & Design, 1993, 1993.*

EDWARD L. CAREY, B.S.M.E., 1961, Lawrence Technological University; General Motors. *Lecturer in Mathematics and Computer Science, 1972, 1972.*

MERRIE CARLOCK, ASLA; RLA; B.S. Nat.Res., 1977, M.L.A., 1983, University of Michigan. City of Southfield. *Lecturer in Architecture. 1994, 1994.*

FACULTY ROSTER

PATRICIA ANN CASTELLI, B.G.S., 1987, Roosevelt University; M.B.A., 1992, Lawrence Technological University; Ph.D., 1994, Wayne State University. *College Professor in Management, 1995, 1999.*

CHARLES M. CHAMBERS, B.S., 1962, M.S., 1963, Ph.D., 1964, University of Alabama; J.D., 1976, George Washington University. *Professor of Physics, 1993, 1993.*

CLARENCE G. CHAMBERS, JR., B.S.M.E., 1957, M.S., 1959, Michigan State University. *Associate Professor Emeritus of Mechanical Engineering, 1959, 1999.*

ROBERT DARROW CHAMPLIN, AIA; APA; B.S.Ar., 1953, University of Cincinnati; M.U.P., 1966, Wayne State University. *Professor Emeritus of Architecture, 1961, 1996.*

KATHERINE M. CHARBENEAU, B.S., 1989, Lawrence Technological University, M.A., 1993, Oakland University. *Lecturer in Humanities, 1995, 1995.*

DAVID M. CHASCO, AIA, RA; B.A.Ar., 1976, M.Ar., 1980, University of Illinois. *Professor of Architecture, 1984, 2001.*

CHIDI A. CHIDI, PE; B.S.M.E., 1979, M.S.M.E., 1980, University of Michigan; Ph.D., 1994, University of Detroit Mercy. Detroit Diesel Corporation. *Lecturer in Mathematics and Computer Science and Mechanical Engineering, 1991, 1991.*

CHAN-JIN CHUNG, B.S.C.S., 1981, Hong-Ik University; Ph.D., 1997, Wayne State University. *Assistant Professor of Computer Science, 1998, 1998.*

OLEH R. CIEPLY, PE; B.S.C.E., 1958, University of Toledo. Wade-Trim/Assoc. *Lecturer in Civil Engineering, 1989, 1989.*

MOLLIE M. CLARAHAN, IES, IALD, B.S. Int. Merch., 1986, Oregon State University. Lumenations, Inc. *Lecturer in Architecture, 2000, 2000.*

LAURA A. CLARY, B.Arch., 1995, Lawrence Technological University, M.Arch., 1997, University of Illinois. *Lecturer in Architecture, 1999, 1999.*

MICHAEL J. CLOUD, B.S.E.E., 1983, M.S.E.E., 1985, Ph.D., 1987, Michigan State University. *Associate Professor of Electrical Engineering, 1987, 1992.*

NEVILLE H. CLOUTEN, FRAIA; RIBA; RA, Australia; B.Ar., 1962, University of Sydney; M.Ar., 1966, Ohio State University; Ph.D., 1968, Edinburgh University. *Professor of Architecture, 1990, 1990.*

ALBERT COHEN, B.S.B.A., 1943, Boston University. *Lecturer in Management, 1984, 1984.*

LENORE R. COLEMAN, B.S., 1957, Eastern Michigan University, M.A., 1978, University of Delaware. *Lecturer in Humanities, 1999, 1999.*

DONALD F. CONDIT, B.B.A., 1960, University of Notre Dame; M.B.A., 1962, University of Michigan. *Associate Professor of Management, 1985, 1989.*

KENNETH J. COOK, PE; B.S.E.E., 1964, Lawrence Technological University. Valeron Corporation. *Lecturer in Engineering Technology, 1964, 1964.*

RONALD J. CORKINS, PE; B.S.E.E., 1971, Michigan State University. Detroit Edison. *Lecturer in Engineering Technology, 1988, 1988.*

GARY CORNILLAUD, AIA; B.S.Ar., 1973, B.Arch., 1975, Lawrence Technological University. Harley Ellington Design. *Lecturer in Architecture, 1996, 1996.*

GARNET R. COUSINS, AIA; Ph.B., 1964, Wayne State University; B.S.Ar., 1973, B.Ar., 1975, Lawrence Technological University. Private practice. *Lecturer in Architecture, 1981, 1981.*

BRAD S. COVAL, B.S.M.E., 1993, Lawrence Technological University; M.S.E.M., 1998, Oakland University. *Lecturer in Mathematics, 1999, 1999.*

JERRY L. CRIST, B.S., 1963, Ohio Northern University; M.S., 1966, Ph.D., 1968, Ohio State University. *Professor of Chemistry, 1968, 1982.*

FRANK A. CUSMANO, B.S.B.A., 1984, Lawrence Technological University; M.B.A., 1988, Wayne State University. Detroit Police Department. *Lecturer in Management, 1988, 1988.*

JOHN DAVIDS, B.Arch., 1981, M.Arch., 1984, University of Michigan. *Lecturer in Architecture, 1998, 1998.*

ROBERT F. DAVISSON, B.A., 1970, Oakland University; J.D., 1977, University of Detroit Mercy. *Lecturer in Humanities, 1997, 1997.*

WALTER K. DEAN, B.A., 1967, Carleton College; M.S., 1969, Ph.D., 1972, University of Wisconsin. *Professor of Chemistry, 1983, 2001.*

LOUIS A. DeGENNARO, B.A., 1965, University of Detroit Mercy; J.D., 1968, Detroit College Law. *Professor of Management, 1971, 1985.*

MAHMOUD DEMERI, M.S., 1986, Wayne State University; Ph.D., 1976, University of Kentucky. Ford Motor Company. *Lecturer in Mechanical Engineering, 1994, 1994.*

AMY G. DEINES, B.F.A. Interior Architecture, 1994, Wayne State University. *Lecturer in Art and Design and Architecture, 1999, 1999.*

KELLY DEINES, B.Int.Arch., 1985, Kansas State University; M.F.A., 1989, Cranbrook Academy of Art. *Lecturer in Art and Design, 1998, 1998.*

RICHARD M. DENGATE, B.S., 1964, Central Michigan University; M.A., 1970, Wayne State University. *Lecturer in Humanities, 1989, 1989.*

LEN DILAURA, A. Architectonics, 1974, Washtenaw Community College; B.S.Int., 1981, Eastern Michigan University. *Lecturer in Interior Architecture, 1995, 1995.*

KENNETH DIVITO, AIA; ASAP; RA; B.S.Ar., 1967, Lawrence Technological University. Minoru Yamasaki Associates. *Lecturer in Architecture and Art & Design, 1991, 1991.*

EDWARD DOLAN, B.S., 1953, Brown University; Ph.D., 1963, Cornell University. *Lecturer in Chemistry, 1992, 1992.*

PHILLIP DONDERO, B.S. Urban Planning, 1959, Michigan State University; M.S., 1966, Athens Technological Institute. *Lecturer in Architecture, 1994, 1994.*

FACULTY ROSTER

ADA C. DONG, B.S., 1983, Chengdu Institute of Radio Engineering; M.S., 1990, Ph.D., 1996, Oakland University. *Assistant Professor of Computer Science, 1998, 1998.*

HANS DOURRA, B.S.E.E., 1981, Lawrence Technological University; M.S.E.E., 1982, Wayne State University. Chrysler Corporation. *Lecturer in Engineering Technology, 1986, 1986.*

MAUREEN DOYLE, B.A., 1988, University of Wyoming; M.A., 1998, Wayne State University. *Lecturer in Mathematics and Computer Science, 1999, 1999.*

THOMAS W. DRAGON, B.E.E., 1956, University of Detroit Mercy; M.S.E., 1957, University of Michigan. Unisys Corporation. *Lecturer in Electrical Engineering, 1966, 1966.*

ALETIA J. DROBA, B.A., 1989, Moorhead State University; M.A., 1995, Wayne State University. *Lecturer in Mathematics and Computer Science, 1999, 1999.*

LAURA A. DUPREY, B.S., 1992, Lawrence Technological University, M.A., 1996, Oakland University. *Lecturer in Humanities, 1999, 1999.*

JAMES M. DURHAM, JR., B.A., 1985, Eastern Michigan University, M.A., 1991, Ph.D., 1998, Wayne State University. *Lecturer in Humanities, 1998, 1998.*

MOHAMMED K. EL-BATHY, B.S., 1976, Cairo University; M.S., 1986, Wayne State University. *Lecturer in Computer Science, 2000, 2000.*

CHARLES B. ELIAS, ASLA; B.A.Biol., 1951, University of Minnesota; B.L.A., 1992, Michigan State University. D & B Landscaping. *Lecturer in Architecture, 1994, 1994.*

DANIEL L. FAORO, RA; AIA; B.Arch., 1981, University of Illinois, M.Arch. Urban Design, 1983, Harvard University. *Associate Professor of Architecture, 2000, 2000.*

H. ROBERT FARRAH, PE; B.S.E.E., 1955, Massachusetts Institute of Technology; M.S.E.E., 1963, M.B.A., 1969, Ph.D.E.E., 1997, Wayne State University. *Professor of Electrical Engineering, 1976, 1989.*

JEFFREY S. FARRAH, B.A., 1991, M.A., 1995, Wayne State University. *Lecturer in Humanities, 1998, 1998.*

RUTH G. FAVRO, B.A., 1959, Wellesley College; M.S., 1961, New York University. *Associate Professor of Mathematics and Computer Science, 1973, 1994.*

VERNON M. FERNANDEZ, B.E.M.E., 1978, University of Bombay; M.A.Sc.M.E., 1986, University of Windsor; Ph.D., 1989, Oakland University. *Associate Professor of Mechanical Engineering, 1988, 1992.*

SAMUEL G. FERRARO, B.A., 1958, University of Colorado; M.A., 1969, University of Michigan. Detroit Edison. *Lecturer in Mathematics and Computer Science, 1998, 1998.*

HARVEY FERRERO, RA; B.S.Ar.E., 1955, Lawrence Technological University. Harvey Ferrero Architect. *Lecturer in Architecture and Art & Design, 1963, 1963.*

MICHAEL A. FITZMORRIS, ASLA; B.A.Psychology, 1983, University of California, Berkley, M.Landscape Design, 1989, California State Polytech University. *Lecturer in Architecture, 1999, 1999.*

PAUL FONTAINE, B.G.S., 1989, University of Michigan; M.S. Urban Planning, 1991, Columbia University; Post Graduate studies, University of Michigan. Fontaine Associates. *Lecturer in Architecture, 1995, 1995.*

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IMPORTANT NOTES



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- 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

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- Chemical Technology
- Construction Engineering Technology
- Electrical Engineering Technology
- Manufacturing Engineering Technology
- Mechanical Engineering Technology
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GRADUATE DEGREES

- Master of Architecture
- Master of Architecture post professional degree
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- Master of Business Administration
- Master of Civil Engineering
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- Master of Engineering/Manufacturing Systems
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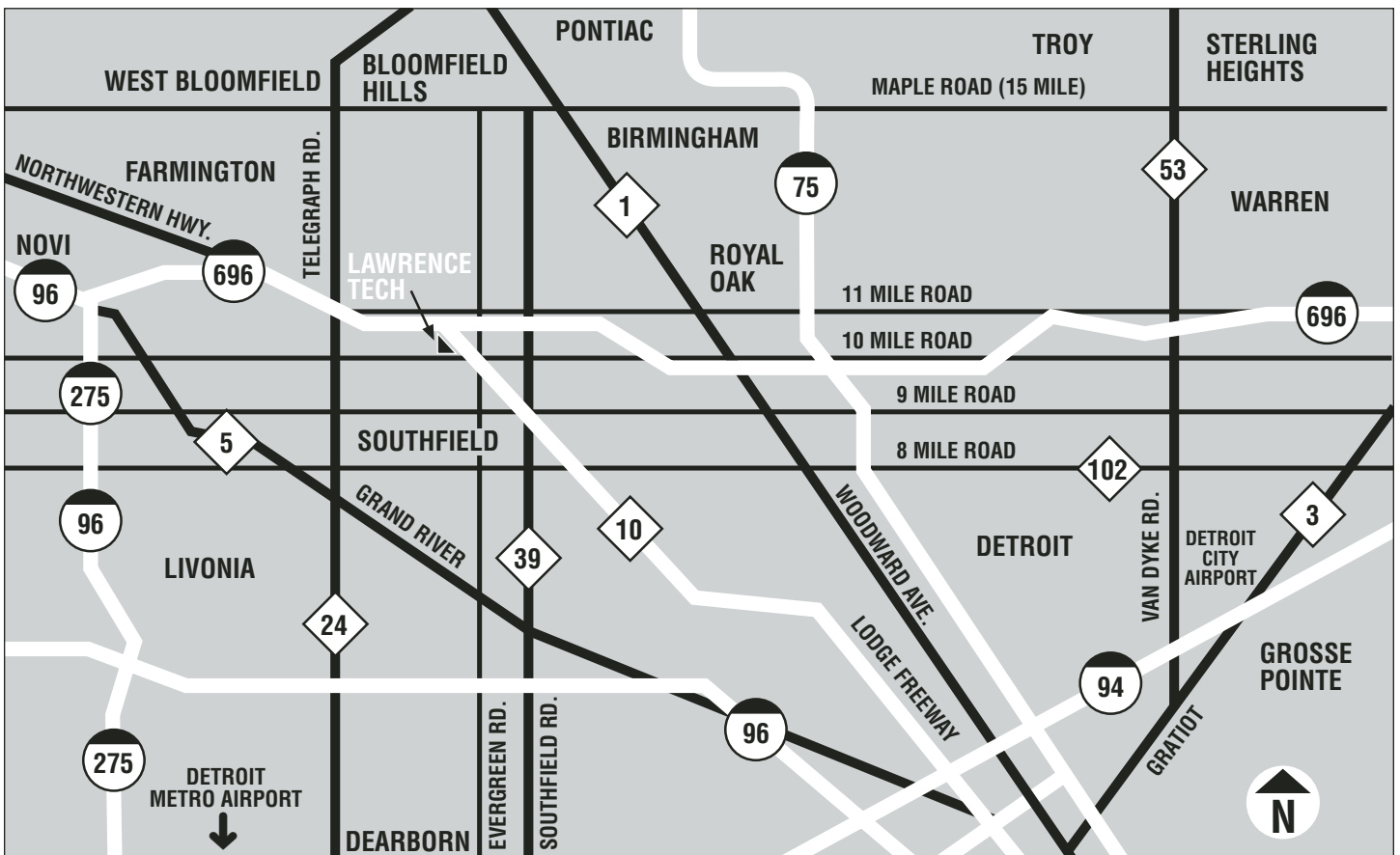
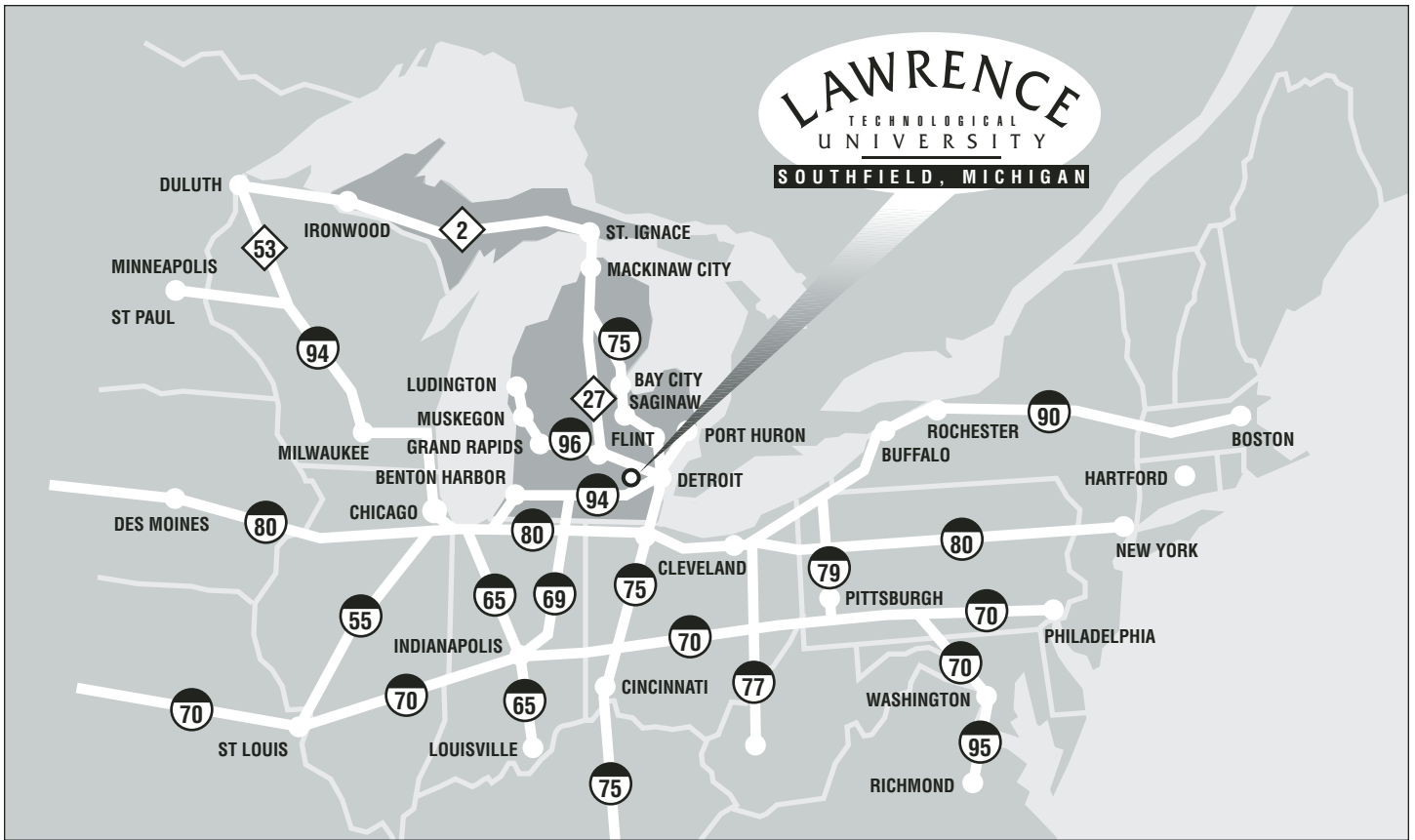
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REGIONAL MAP



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