COLLEGE OF ENGINEERING

Administration

Nagi G. Naganathan, professor and dean

Nitschke Hall Room 5012 Phone: 419.530.8000
nagi.naganathan@utoledo.edu Fax: 419.530.8006

Steven E. LeBlanc, professor and director of academic affairs

sleblanc@eng.utoledo.edu Phone: 419.530.8264

Patricia Mowery, executive secretary

pmowery@eng.utoledo.edu Phone: 419.530.8000

Undergraduate Studies

Brian W. Randolph, professor and associate dean for undergraduate studies

Nitschke Hall Room 1045 Phone: 419.530.8040
brian.randolph@utoledo.edu Fax: 419.530.8046

Jon Pawlecki, senior associate director for pre-college activities

jpawleck@eng.utoledo.edu Phone: 419.530.8045

Research and Graduate Studies

Mohamed Samir Hefzy, professor and interim associate dean

Nitschke Hall Room 1014 Phone: 419.530.6086
mhefzy@eng.utoledo.edu Fax: 419.530.7392

College Computing

Gregory Gaustad, director

Nitschke Hall Room 1010 Phone: 419.530.8020
gaustad@eng.utoledo.edu Fax: 419.530.8026

College Relations

Christine M. Smallman, director of college relations and facilities management

Nitschke Hall Room 5006 Phone: 419.530.8014
csmallma@eng.utoledo.edu Fax: 419.530.8006

Engineering Cooperative Education Program and Career Management

Vickie L. Kuntz, lead co-op director

Nitschke Hall Room 1045 Phone: 419.530.8054
vkuntz@eng.utoledo.edu Fax: 419.530.8056

Academic Departments

Bioengineering

Vijay K. Goel, chair

Nitschke Hall Room 5051C Phone: 419.530.8030
vijay.goel@utoledo.edu Fax: 419.530.8076

Scott C. Molitor, undergraduate program director

smolito@utnet.utoledo.edu

Patricia A. Relue, graduate program director

prelue@eng.utoledo.edu

Deborah Roberts, int. academic program coordinator

dkrobn2@utnet.utoledo.edu

Chemical and Environmental Engineering

G. Glenn Lipscomb, chair

Nitschke Hall Room 3048 Phone: 419.530.8080
glenn.lipscomb@utoledo.edu Fax: 419.530.8086

Connie Schall, undergraduate program director

constance.schall@utoledo.edu

Arunan Nadarajah, graduate program director

nadarajah@utoledo.edu

Julie A. Fischer-Kinney, academic program coordinator

julie.fischer-kinney@utoledo.edu

Civil Engineering

Ashok Kumar, chair and acting graduate program director

Nitschke Hall Room 3006 Phone: 419.530.8115
ashok.kumar@eng.utoledo.edu Fax: 419.530.8116

Andrew Heydinger, undergraduate program director

andrew.heydinger@utoledo.edu

Vandra Robinson, int. academic program coordinator

vandra.robinson@eng.utoledo.edu

Electrical Engineering and Computer Science

Roger J. King, interim chair

Nitschke Hall Room 2008 Phone: 419.530.8140
rking@eecs.utoledo.edu Fax: 419.530.8146

Gerald R. Heuring, C.S.E. undergraduate program director

jheuring@eecs.utoledo.edu

Jungwan Kim, graduate program director

jkim@utnet.utoledo.edu

Amy Kall, academic program coordinator

amy.kall@eng.utoledo.edu

Mechanical, Industrial and Manufacturing Engineering

Abdollah A. Afjeh, chair

Nitschke Hall Room 4006 Phone: 419.530.8200
aafjeh@eng.utoledo.edu Fax: 419.530.8206

Douglas L. Oliver, I.E. and M.E. undergraduate program director

douglas.oliver@utoledo.edu

Mohamed Samir Hefzy, graduate program director

mhefzy@eng.utoledo.edu

Debbra Kraftchick, academic program coordinator

dkraftch@eng.utoledo.edu

Engineering Technology

Daniel J. Solarek, chair

Engineering Technology Center Room 1127 Phone: 419.530.3377
dsolarek@eng.utoledo.edu Fax: 419.530.3068

Richard A. Springman, student support director

rspringm@eng.utoledo.edu

Allen Rioux, CSET undergraduate program director, online services director

allen.rioux@utoledo.edu

Ella Fridman, graduate program director

ella.fridman@utoledo.edu

Frederick Nelson, E.E.T. undergraduate program director

fnelson@eng.utoledo.edu

Richard (Tabb) Schreder, M.E.T. undergraduate program director

richard.schreder@utoledo.edu

Nicholas Kissoff, C.E.T. undergraduate program director

nkissof@utnet.utoledo.edu

Myrna Swanberg, academic program coordinator

myrna.swanberg@utoledo.edu

COLLEGE OF ENGINEERING

Engineering Programs

Accreditation

The College of Engineering's bachelor of science programs in bioengineering, chemical engineering, civil engineering, computer science and engineering, electrical engineering, and industrial engineering and mechanical engineering are accredited by the Engineering Accreditation Commission (EAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, Telephone: 410.347.7700. The program in computer science and engineering also is accredited by the Computing Accreditation Commission (CAC) of ABET.

The mission of the College of Engineering is to achieve prominence as a student-focused college that educates engineers of recognized quality to be leaders in engineering disciplines, technology and society; and as a college that enhances the well-being of the region, state and nation through the creation and transfer of new knowledge.

Engineering Degree Programs

The College of Engineering offers seven bachelor of science in engineering programs – bioengineering, chemical engineering, civil engineering, computer science and engineering, electrical engineering, and industrial engineering and mechanical engineering. The college also offers four bachelor of science in engineering technology programs that are described in the engineering technology section.

Engineering students may wish to consider a dual degree plan within the College of Engineering. Depending on which two engineering curricula are involved, careful planning from the beginning may permit the completion of both degrees with less than a full year of additional study. In any dual degree plan, the student must be accepted by both major departments and have an adviser from each of the two degree programs. With any combination, the curricular requirements of each individual degree must be met.

Graduate Programs in Engineering

Graduate work in engineering is described in the College of Engineering portion of the Graduate School section of this catalog.

Early Admission to M.S. in Engineering

The College of Engineering offers students currently enrolled in a bachelor of science in engineering program at The University of Toledo an opportunity to begin work toward a master of science degree in engineering. This option offers talented students who intend to continue their education beyond the B.S. a unique opportunity to begin their graduate research activities at an earlier stage in their career and proceed into the graduate programs in a timely manner.

Up to nine semester credit hours of graduate-level technical elective or required courses may be applied toward the B.S. degree in lieu of selected undergraduate elective courses, subject to specific departmental restrictions. Only 5000-level or higher engineering courses taken at The University of Toledo may be applied toward this option. In addition, an approved M.S. plan of study must be filed indicating those courses that will be accepted in lieu of specific B.S. course requirements. Application and admission requirements are described in the graduate section of the catalog.

Normally, the B.S. engineering degree programs (with co-op) require five years and the M.S. engineering degree programs require an additional two years. It is anticipated that by participating in this option, a total of six years will be required for the completion of both degrees.

Minors

Minor in Computer Science and Engineering

Students may earn a minor in computer science and engineering (C.S.E.) by completing the six required courses listed below, plus two courses selected from the list of advanced courses. To be eligible to register for these courses, students must be coded as C.S.E. minor candidates and have successfully completed MATH 1850 and MATH 1860. A GPA of 2.0 is required in the EECS courses.

Required courses:

EECS 1100	Digital Logic Design	4
EECS 1560	Introduction to Object Oriented Programming	3
EECS 1570	Linear Data Structures	3
EECS 1580	Nonlinear Data Structures	3
EECS 1590	Discrete Structures	3
EECS 2100	Computer Organization and Assembly Language	4

Advanced courses (select two):

EECS 2550	Operating Systems and Systems Programming	3
EECS 3100	Microsystems Design	4
EECS 3500	Automata and Language Translation Systems	4
EECS 3550	Software Engineering	3
EECS 4130	Digital Design	3
EECS 4500	Programming Language Paradigms	3
EECS 4510	Translation Systems	4
EECS 4530	Computer Graphics I	4
EECS 4560	Database Systems I	3

Minor in Business Administration

Engineering students may earn a minor in business administration by earning a C or better in six business courses, plus at least one economics course. The economics requirement may be satisfied with MIME 2600 or with ECON 1150 and 1200. The six business courses must include BUAD 2040, while the other five may be selected from the list in the College of Business Administration section. For students whose goal is to earn an M.B.A., the following six courses are recommended:

BUAD 2040	Financial Accounting Information
BUAD 2050	Accounting for Business Decision Making
BUAD 3010	Principles of Marketing
BUAD 3020	Principles of Manufacturing and Service Systems
BUAD 3030	Managerial and Behavioral Processes in Organizations
BUAD 3040	Principles of Financial Management

Students not interested in an M.B.A. may wish to make substitutions in this list. For example, IBUS 3150, Understanding Cultural Differences for Business, could be used in place of any of the above courses except BUAD 2040, to simultaneously satisfy part of the multicultural requirement in the University Core Curriculum. The flexibility of the requirements allows

students to focus in areas such as marketing, sales, finance, management or entrepreneurship.

Students must be sophomores to take the 2000-level business courses and juniors to take the 3000-level courses. Also, BUAD 2040 must be taken before BUAD 3040, and the economics requirement must be satisfied before taking BUAD 3010. Otherwise, business prerequisites are waived for engineering students. Students should register with the College of Business Administration to become candidates for the business minor.

Students in the industrial or mechanical engineering programs may use one of the business courses as a technical elective. Students in the civil or electrical engineering programs may use one of the business courses as a technical elective if they complete the business minor requirements. Students in the chemical or computer science and engineering program may use business courses as free electives. Students interested in a business minor should consult advisers in the College of Business Administration and the College of Engineering.

Programs with Other University of Toledo Colleges

Joint B.S. in Engineering/M.B.A. Program

The College of Business Administration, in conjunction with the College of Engineering, offers a program whereby a student may earn a bachelor of science in engineering and a master of business administration (M.B.A.). This program provides a unique opportunity to combine business and engineering skills to prepare graduates for global competitiveness and supports the mission to prepare corporate leaders for the future. The program should be particularly attractive to students who want to start their own company or who simply want to develop an appreciation for how engineering and business complement each other.

This program will allow engineering students in their final two semesters of study to begin taking M.B.A. courses while completing their B.S. Students with senior standing may be formally admitted into the M.B.A. program and can complete the M.B.A. at the end of six years of study. The business undergraduate prerequisites can be satisfied as part of the undergraduate curriculum.

To be admitted to the program, students must have senior standing, score a minimum of 450 on the Graduate Management Admissions Test (GMAT) and have at least a 3.0 cumulative GPA. Students also must have completed the requirements for the business minor. The business minor courses should be chosen carefully, however, as not all business minor courses can be used towards the M.B.A. The six business courses listed in the business minor section plus MIME 2600 or ECON 1150 and 1200 satisfy the basic core prerequisite requirement for the M.B.A. program for engineering students.

Students who wish to pursue the program should inform the associate dean of undergraduate studies in the College of Engineering during their junior year and complete the GMAT by the end of their junior year. Students should submit completed application materials to the Graduate School for admission to the M.B.A. program **before** fall semester of their senior year. Upon admission to the program by the Graduate School and the College of Business Administration, students will be classified as special provisional graduate students so that they may take graduate courses while completing the bachelor of science degree requirements. Students' special status must be tracked by the M.B.A. office to assure AACSB compliance. Also, the B.S. in engineering must be granted in a semester prior to graduating with the M.B.A.

To satisfy the requirements for the M.B.A., students must complete all of the core and elective required courses in the M.B.A. program. By choosing the correct courses, this may be accomplished with six undergraduate- and 11 graduate-level business courses.

Normally, the B.S. engineering degree programs (with co-op) require five years, and the M.B.A. would require an additional two years. It is anticipated that by enrolling in the two programs simultaneously, a total of six years will be required for completion of both degrees.

Guaranteed Admission Program to The University of Toledo College of Law

Students who graduate with a bachelor of science degree from the College of Engineering, have a minimum GPA of 3.4, an LSAT score at or above the 50th percentile, and who have not committed an act or acts involving moral turpitude (e.g., a felony, an academic suspension) will be guaranteed admission to The University of Toledo College of Law upon submission of a completed application.

Admission Requirements

Entering Freshmen

To be considered for admission to any bachelor of science program in engineering, new, direct-from-high-school students need a minimum cumulative high school GPA of 3.0 **and** a minimum ACT composite score of 22 (or SAT combined score of 1020). Students also must successfully complete a minimum of four years of high school mathematics (with coverage of trigonometry or precalculus) and high school chemistry (physics also is strongly recommended). Students who do not meet the minimum requirements will be considered for admission to the engineering technology program or they may choose another University program.

Transfer Students

Transfer students seeking admission to the bachelor of science programs in bioengineering, chemical engineering, civil engineering, computer science and engineering, electrical engineering, industrial engineering or mechanical engineering must have a minimum GPA of 2.75 from all previous college or university work and have college credit for MATH 1850 Calculus I and CHEM 1230 General Chemistry, or equivalents, with grades of at least a C. Students who have attended more than one university will be evaluated on a case-by-case basis.

Students transferring into the College of Engineering bachelor of science in engineering technology programs in construction engineering technology, electrical engineering technology, mechanical engineering technology, and computer science and engineering technology from other colleges within the University or from other universities must have obtained a minimum cumulative GPA of 2.0. Students not admitted to an engineering program may not take engineering courses unless those courses are required for a degree program outside of engineering.

Students transferring from other institutions must earn at least 32 hours of undergraduate credit in residence at The University of Toledo. At least 14 of

these must be in the major area. The remainder of the credit hours are to be in engineering topics or in other areas that satisfy degree requirements.

Full-time students must take their last semester in residence (part-time students must take their last 14 hours in residence) unless exceptional arrangements have been made in advance with the associate dean of undergraduate studies in the college. Bachelor of science in engineering technology students must earn at least 32 hours at The University of Toledo, not including deficiencies. Associate of applied science students must earn at least 17 hours at The University of Toledo; at least 8 hours must be in the major.

Cooperative (Co-op) Education Program

Students in the engineering programs must complete a cooperative (co-op) educational requirement. For engineering technology students, participation in the co-op program is optional. The purpose of the co-op program is to provide students with career-related experiences. The program also helps students defray the cost of their education and enhances employment opportunities after graduation. The curriculum in each of the engineering programs is set up to accommodate four, and in some cases five, co-op assignments. To satisfy the requirement, a student must participate in at least three semester-long work experiences, alternating with semesters of coursework, but many participate in four or even five. The student pays a $400 fee upon completion of each work experience. Successful completion of each work experience appears on the student's transcript. The college will assist students in finding co-op positions, but does not guarantee placement. Elaborations on implementation policies are available in the college's Career Management Center.

Honors Program

The Honors Program in the College of Engineering provides opportunities for challenging and individual study to undergraduate students of unusually high ability, motivation and initiative.

Students with a minimum high school GPA of 3.5 and a minimum ACT composite of 25 are encouraged to apply. Current University of Toledo students and transfer students may apply for admission to the Honors Program if they have completed at least 15, but not more than 60, graded semester hours with a minimum UT GPA of at 3.5, and have been interviewed by an honors adviser. All admissions to the Honors Program are granted on a space-available basis.

To receive the College Honors citation upon graduation from an engineering bachelor's degree program, the following criteria must be met:

1. A minimum cumulative GPA of 3.3.
2. A total of 33 semester hours in honors courses, six of which must be in the interdisciplinary honors area (Readings Conference) and 10 of which must be in honors courses offered by the UT College of Engineering.
3. An honors thesis or honors project.

Academic Policies

Students in the College of Engineering are subject to the general regulations that apply to all students enrolled in The University of Toledo. The University's General Academic Policies are in the General Section of this catalog. In addition, certain regulations apply only to those who are enrolled in the College of Engineering. These are described below.

General Degree Requirements

To obtain a degree in an undergraduate program, students must have the proper number of credit hours in courses required for the curriculum, a minimum overall cumulative GPA of 2.0 (average of C), and a minimum GPA of 2.0 in the student's major. When a course is repeated (see below), only the grade the last time a course was taken is used in the calculation of the major GPA.

Pass/No Credit Option

Engineering students have the option to take a maximum of two humanities/fine arts/social science/multicultural courses on a pass/no credit basis. Pass/no credit grade forms are available in the Engineering Undergraduate Office (Nitschke Hall Room 1045). The form must be returned to the Registrar's Office before the end of the 15th calendar day of the term.

Repeated Courses/Grade Deletion

Students may repeat a previously attempted course. If the grade in the repeated course is higher, the student may petition the college in which the course is taught to have the initial grade deleted from the overall GPA calculation. Complete information about the Grade Deletion Policy may be found in General Academic Policies in the General Section of this catalog. When a course in the major is repeated, only the grade the last time the course is taken is used in the major GPA calculation.

Curricular Requirements

All seven of the 128-hour bachelor of science programs in engineering have a common structure of mathematics, basic sciences, humanities/fine arts, social sciences, multicultural studies and engineering topics. The four 128-hour bachelor's programs in engineering technology have curricula that lead to a four-year bachelor of science degree.

The required curriculum and recommended course sequence for each engineering program is presented in the departmental section of this catalog. These curricula permit the student to complete the degree requirements, along with the co-op requirement, in **five** years.

University Core Curriculum

All engineering degree candidates are required to complete between 27 and 30 credit hours of courses that comprise the University Core Curriculum. This will satisfy the humanities/fine arts/social sciences/multicultural requirement in the College of Engineering. *Please refer to the General Section of this catalog for additional information.*

Mathematics and Basic Science

All bachelor of science programs in engineering require at least 32 hours of mathematics and basic science that include calculus through differential equations, 10 hours of calculus-based physics and at least one semester of general chemistry. Courses required in these subjects include MATH 1850, 1860, 2850 and 3860; PHYS 2130 and 2140; and CHEM 1230. Individual programs may have additional requirements in mathematics, chemistry and/or biology.

Engineering Topics

Each program requires a minimum of 48 hours of engineering topics. This is designed to give the graduate a sound background in engineering science and

a meaningful design experience appropriate to the selected field of study. The desired outcomes vary from one program to another, but it is expected that graduates from all the B.S. programs will have attained:

- An ability to apply knowledge of mathematics, science and engineering;
- An ability to design and conduct experiments, as well as to analyze and interpret data;
- An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- An ability to function on multi-disciplinary teams;
- An ability to identify, formulate and solve engineering problems;
- An understanding of professional and ethical responsibility;
- An ability to communicate effectively;
- The broad education necessary to understand the impact of engineering solutions in global, economic, environmental and societal contexts;
- A recognition of the need for and an ability to engage in life-long learning;
- A knowledge of contemporary issues; and
- An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Required Academic Performance

All students are expected to maintain a minimum cumulative GPA of 2.0. A student who achieves less than a 2.0 GPA the first semester will be placed on probation and is expected to make marked advancement in subsequent semesters in order to achieve an overall 2.0 GPA. Anything less will lead to suspension or dismissal according to the policy outlined below.

After 100 hours have been attempted, students should request a degree audit from their undergraduate director to formulate plans for completion of the program and obtain the necessary approval of the associate dean of undergraduate studies. Preparation of the final two-semester schedule should be completed to assure that the degree requirements will be met. Application for graduation should be made at the Registrar's Office before the published deadline.

Probation, Suspension, Readmission and Dismissal

After each semester, each student's progress is reviewed. Students who do not meet the minimum academic achievement level will be placed on probation or, if already on probation, may be suspended or dismissed from the college according to the rules below:

Probation

1. A student whose cumulative GPA is less than 2.0 will be placed on probation. In successive semesters, a student may remain in school as long as he/she continues to earn a GPA greater than 2.0 in each term. However, the student will remain on probation as long as the cumulative GPA is below 2.0. A student is removed from probation when the cumulative GPA is above 2.0.
2. A student earning a 1.5 GPA or less in any semester, regardless of the overall GPA, will be placed on probation.
3. Students on probation will not be permitted to interview for co-op positions.

Suspension

1. A student on probation whose cumulative and current semester GPA falls below 2.0 will be subject to suspension from the college for one semester.
2. Consideration of a student's petition for reinstatement will be given only after **one semester** from the date of suspension. In some circumstances, the suspension may be deferred.

Readmission

1. Readmission will **only** be by written petition to the college's associate dean of undergraduate studies. Readmission decisions will be made by the associate dean of undergraduate studies in conjunction with the department to which the student is requesting readmission.
2. The petition must be typewritten and must be received at least one month prior to the start of the semester the student desires to return.

Dismissal

1. If readmission is granted after a suspension, the student will be subject to dismissal from the college unless he/she earns a semester average greater than 2.0 each term until the cumulative GPA is above 2.0.
2. Further consideration of a student's petition for reinstatement will be given only after **one year** from the date of dismissal.

Professional Registration

Graduates of Engineering Programs

Registration by the State of Ohio as a Professional Engineer is important for professional practice and requires four years of engineering experience after graduation. However, the first step is applying for and passing the Fundamentals of Engineering (FE) examination, formerly known as the Engineer-in-Training (EIT) exam. The exam is generally given in April and October of each year. Application deadlines, however, are several months earlier. All engineering graduates are strongly encouraged to take the FE near their date of graduation and are permitted to sit for the exam up to six months prior to graduation with a letter from the dean. After the necessary period of acceptable engineering experience, the State Board of Registration will permit the graduate to take the Professional Engineers (PE) examination. Engineering Technology graduates must pass the FE exam and need a minimum of eight years of engineering experience before taking the PE exam.

For students graduating in the spring or summer, the FE Examination is given in Cincinnati, Columbus and Cleveland during a Saturday in April. For fall graduates, the FE exam is given in Cincinnati, Columbus and Cleveland on a Saturday in October. Applications should be filed with the board in Columbus at least 90 days prior to the examination date. Additional information is available in the Office of the Associate Dean of Undergraduate Studies, or from the Secretary of the Board of Registration for Professional Engineers and Surveyors, 77 S. High St., Columbus, OH 43266-0314, *www.ohiopeps.org*, or from the National Council of Examiners for Engineering and Surveying Web site at *www.ncees.org*.

Programs of Study

Department of Bioengineering

Vijay K. Goel, chair

Degrees Offered

The department of bioengineering offers an ABET-accredited course of study leading to the bachelor of science degree in bioengineering (B.S.B.E.) degree.

Bioengineering is a relatively new discipline that applies engineering and life science principles to study, understand, modify and control biological systems. Bioengineering is a branch of engineering in which knowledge and skills are applied to define and solve problems in biology and medicine. Bioengineers develop and improve concepts, techniques and solutions that may be applied to a variety of problems in medicine and in the manufacture of biomedical products, instruments and devices. Bioengineers are employed by various industries, including pharmaceutical companies, the bioprocessing industry, medical device manufacturers, hospitals, academic and industrial research facilities, and in governmental regulatory agencies.

The bioengineering program of study combines a background in biology with training in advanced mathematics, chemistry, physics and traditional engineering topics. The educational objectives of our program result in graduates who will:

- Obtain positions as practicing engineers in various industries and government agencies that are involved in the development, testing, marketing and regulation of medical devices, medical systems, diagnostic systems, pharmaceuticals and other therapeutic systems;
- Continue their studies in medical schools to pursue careers as physicians in the practice of clinical medicine; or
- Continue their studies in graduate programs to pursue careers in biomedical research, business or law.

The first component of the undergraduate curriculum is a balanced general education in communication skills, social sciences, humanities/fine arts and an awareness of multicultural issues. The next component is a background in biology, chemistry, mathematics, physics, physiology and computers. A general engineering component provides students with a foundation in electrical engineering, mechanics, thermodynamics and transport phenomena. Additional coursework in biomechanics, bioprocessing and medical instrumentation apply general engineering principles to biological and medical systems. A series of technical elective courses give students the opportunity to specialize in orthopedic biomechanics, diagnostic devices and sensors, medical imaging or cellular and molecular biology. Students also may use some of their technical electives (e.g., organic chemistry) to satisfy the entrance requirements for medical schools. The curriculum culminates in a two-semester design project that serves to integrate, apply and demonstrate the knowledge gained throughout the program.

More information is available on the department Web site at *www.bioe.eng.utoledo.edu*

Premed Programs

Bioengineering provides an excellent preparation for students interested in pursuing medical careers. Bioengineering undergraduates acquire research skills that are desired by the best medical schools and receive a technical education that prepares future physicians for advances in medical technology. According to the American Association of Medical Colleges (AAMC) Data Warehouse, bioengineers are accepted into medical school at higher rates compared to students majoring in the biological sciences. The department of bioengineering at the University of Toledo offers a pre-med concentration that allows students to take the courses that will prepare them for the Medical College Admission Test (MCAT) exam and for medical school. Any student in bioengineering can receive a B.S.B.E with a pre-med concentration if he/she successfully completes the following courses:

CHEM 24 10/2460	Organic Chemistry I w/ laboratory
CHEM 2420/2470	Organic Chemistry II w/ laboratory

Students interested in using bioengineering as a premedicine program should consult with both the premed adviser in the College of Arts and Sciences and the academic program coordinator in the department of bioengineering.

Accelerated Premed Program

The department of bioengineering at the University of Toledo offers a special program that allows premed students entering the bioengineering program directly from high school to complete their B.S. in bioengineering in four years with an accelerated curriculum. To qualify for this program, premed students must earn a minimum GPA of 3.7 during their first semester and maintain a minimum cumulative GPA of 3.7 through the end of their second year. Interested premed students should contact the academic program coordinator to participate in this program.

Joint B.S./M.D. Program with MUO

The department of bioengineering also offers a joint BS/MD program with the Medical University of Ohio (MUO) at Toledo. Following completion of their B.S. in bioengineering, students in this program are guaranteed acceptance into the medical school at the Medical University of Ohio provided they maintain a cumulative GPA of at least 3.5 upon graduation with a B.S. in Bioengineering. To qualify for this program, all of the following requirements must be met:

- a high school GPA of at least 3.8 on a 4.0 scale;
- a composite ACT score of at least 29 or a composite SAT score of at least 1300;
- a successful interview with MUO faculty.

A maximum of 10 first-year students are selected for this program every year. An application form for this program is available on the department Web site at *http://www.bioe.eng.utoledo.edu/forms/bsmdapplication.pdf.*

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Bioengineering Program -–Plan A, B or C (PreMed Option) charts.

Bioengineering Program - Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 Chemistry Lab I 1 cr. ENGL 1110 College Composition I 3 cr. BIOE 1000 Orientation & Intro to BioE 2 cr. **Total 14 hours**	CHEM 1240 General Chemistry II 4 cr. CHEM 1290 Chemistry Lab II 1 cr. MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Engineering Physics I 5 cr. BIOE 1200 Computer Applications 3 cr. **Total 17 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calc. 4 cr. PHYS 2140 General Physics II 5 cr. BIOL 2150 Fund of Life Science I 4 cr. BIOL 2160 Fund of Life Science Lab 1 cr. BIOE 2200 Biomaterials 3 cr. **Total 17 hours**	MATH 3860 Elem. Diff. Equations 3 cr. BIOL 2170 Fund of Life Science II 4 cr. BIOL 2180 Fund of Life Science II Lab 1 cr. BIOE 1010 Professional Development 1 cr. BIOE 2100 BioE Thermodynamics 3 cr. CIVE 1150 Statics 3 cr. **Total 15 hours**	EECS 2300 Electric Circuits 4 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 13 hours**
Pre-Junior Year	BIOE 3940-001 Co-Op Experience # 1	BIOE 3110 Biomechanics 3 cr. BIOE 3300 Biomedical Electronics 4 cr. BIOE 4300 Analysis of BioE Systems 3 cr. ENGL 2950 Sci. & Tech. Rpt. Writing 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**	BIOE 3940-002 Co-Op Experience # 2
Junior Year	BIOE 3200 Physiology for Bioengineers 3 cr. BIOE 3400 Biotransport Phenomena 3 cr. BIOE 3500 Bioprocessing Lab 3 cr. Technical Elective 3 cr. **Total 12 hours**	BIOE 3940-003 Co-Op Experience # 3	Coursework for deficiencies, medical school prerequisites, business administration minor, graduate study or additional co-op experience.
Senior Year	BIOE 4120 Biosignal Processing 3 cr. BIOE 4410 Design Project I 3 cr. BioE Technical Elective 3 cr. Technical Elective 3 cr. **Total 12 hours**	BIOE 4420 Design Project II 3 cr. BioE Technical Elective 3 cr. Technical Elective 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 12 hours**	

Bioengineering Program - Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 Chemistry Lab I 1 cr. ENGL 1110 College Composition I 3 cr. BIOE 1000 Orientation & Intro to BioE 2 cr. **Total 14 hours**	CHEM 1240 General Chemistry II 4 cr. CHEM 1290 Chemistry Lab II 1 cr. MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Engineering Physics I 5 cr. BIOE 1200 Computer Applications 3 cr. **Total 17 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calc. 4 cr. PHYS 2140 General Physics II 5 cr. BIOL 2150 Fund of Life Science I 4 cr. BIOL 2160 Fund of Life Science Lab 1 cr. CIVE 1150 Statics 3 cr. **Total 17 hours**	MATH 3860 Elem. Diff. Equations 3 cr. BIOL 2170 Fund of Life Science II 4 cr. BIOL 2180 Fund of Life Science II Lab 1 cr. BIOE 1010 Professional Development 1 cr. BIOE 2100 BioE Thermodynamics 3 cr. BIOE 3110 Biomechanics 3 cr. **Total 15 hours**	EECS 2300 Electric Circuits 4 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 13 hours**
Pre-Junior Year	BIOE 2200 Biomaterials 3 cr. BIOE 3200 Physiology for Bioengineers 3 cr. BIOE 3400 Biotransport Phenomena 3 cr. BIOE 3500 Bioprocessing Lab 3 cr. ENGL 2950 Sci. & Tech. Rpt. Writing 3 cr. Total 15 hours	BIOE 3940-001 Co-Op Experience # 1	Coursework for deficiencies, medical school prerequisites, business administration minor, graduate study or additional co-op experience.
Junior Year	BIOE 3940-002 Co-Op Experience # 2	BIOE 3300 Biomedical Electronics 4 cr. BIOE 4300 Analysis of BioE Systems 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. Technical Elective 3 cr **Total 13 hours**	BIOE 3940-003 Co-Op Experience # 3
Senior Year	BIOE 4120 Biosignal Processing 3 cr. BIOE 4410 Design Project I 3 cr. BioE Technical Elective 3 cr. Technical Elective 3 cr. **Total 12 hours**	BIOE 4420 Design Project II 3 cr. BioE Technical Elective 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. Technical Elective 3 cr **Total 12 hours**	

Bioengineering Program - Plan C (Accelerated PreMed Option)

	Fall Semester		Spring Semester		Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I	4 cr.	CHEM 1240 General Chemistry II	4 cr.	
	CHEM 1230 General Chemistry I	4 cr.	CHEM 1290 Chemistry Lab II	1 cr.	
	CHEM 1280 Chemistry Lab I	1 cr.	MATH 1860 Single Variable Calculus II	4 cr.	
	ENGL 1110 College Composition I	3 cr.	PHYS 2130 Engineering Physics I	5 cr.	BIOE 3940-001 Co-op Experience # 1
	BIOE 1000 Orient. & Intro to Bioengr.	2 cr.	BIOE 1200 Computer Applications	3 cr.	
			BIOE 1010 Professional Development	1 cr.	
	Total 14 hours		**Total 18 hours**		
Sophomore Year	MATH 2850 Elem. Multivariable Calc.	4 cr.	MATH 3860 Differential Equations	3 cr.	
	PHYS 2140 Engineering Physics II	5 cr.	EECS 2300 Electric Circuits	4 cr.	
	BIOL 2150 Fund of Life Science I	4 cr.	BIOL 2170 Fund of Life Science II	4 cr.	
	BIOL 2160 Fund of Life Science Lab I	1 cr.	BIOL 2180 Fund of Life Science Lab II	1 cr.	BIOE 3940-002 Co-Op Experience # 2
	CHEM 2410 Organic Chemistry I	3 cr.	CHEM 2420 Organic Chemistry II	3 cr.	
	CHEM 2460 Organic Chemistry Lab I	1 cr.	CHEM 2470 Organic Chemistry Lab II	1 cr.	
	Total 18 hours		**Total 16 hours**		
Junior Year	BIOE 2200 Biomaterials	3 cr.			
	BIOE 3200 Physiology for Bioengineers	3 cr.	BIOE 2100 BioE Thermodynamics	3 cr.	
	BIOE 3500 Bioprocessing Lab	3 cr.	BIOE 3110 Biomechanics	3 cr.	BIOE 3940-003 Co-Op Experience # 3
	CIVE 1150 Statics	3 cr.	BIOE 3300 Biomedical Electronics	4 cr.	
	ENGL 2950 Sci. & Tech. Rpt. Writing	3 cr.	BIOE 4300 Analysis of BioE Systems	3 cr.	
	Hum./Soc. Sci./Multicultural Elective	3 cr.	Technical Elective*	3 cr	
	Total 18 hours		**Total 16 hours**		
Senior Year	BIOE 3400 Biotransport Phenomena	3 cr.	BIOE 4420 Design Project II	3 cr.	* Select carefully, the admission requirements for your selected medical school may have special requirements.
	BIOE 4120 Biosignal Processing	3 cr.	BioE Technical Elective	3 cr.	
	BIOE 4410 Design Project I	3 cr.	Hum./Soc. Sci./Multicultural Elective	3 cr.	
	BioE Technical Elective	3 cr.	Hum./Soc. Sci./Multicultural Elective	3 cr.	
	Hum./Soc. Sci./Multicultural Elective	3 cr.	Hum./Soc. Sci./Multicultural Elective	3 cr.	
	Total 15 hours		**Total 15 hours**		

Technical Electives

In addition to required courses, each student must complete at least 15 credit hours of technical electives. Of these, at least six credit hours must be selected from 4000-level BIOE courses. The remaining nine credit hours are chosen from upper-level (3000-level and above) courses in engineering, mathematics or the natural sciences. Courses not shown below must be approved by the undergraduate program director to qualify as technical electives:

Biomechanics

MIME	2300	Engineering Dynamics
BIOE	4110	Advanced Biomechanics
BIOE	4710	Biomechanics of Soft & Hard Tissues
BIOE	4730	Computational Orthopedic Biomechanics
BIOE	4750	Experimental Biomechanics

Neuroengineering and Nanotechnology

BIOL	3030	Cell Biology
BIOE	4200	Biosystems and Control
BIOE	4720	Cellular Electrophysiology
BIOE	4810	Introduction to Nanotechnology
BIOE	4820	Nanotechnology & Microfabrication

Optics and Imaging

PHYS	3070	Quantum Physics for Engineers
EECS	3700	Electromagnetics
BIOE	4350	Biomedical Optics
BIOE	4640	Medical Imaging
BIOE	4670	Ultrasound Principles and Applications

Premedicine

CHEM	2410	Organic Chemistry I
CHEM	2420	Organic Chemistry II
CHEM	2460	Organic Chemistry Lab I
CHEM	2470	Organic Chemistry Lab II
CHEM	3510	Biochemistry I
BIOE	4200	Biosystems and Control
BIOE	4720	Cellular Electrophysiology

Tissue Engineering

BIOL	3010	Molecular Genetics
BIOL	3030	Cell Biology
BIOE	4610	Artificial Organs
BIOE	4710	Biomechanics of Soft & Hard Tissues
BIOE	4740	Tissue Engineering

Degree Requirements

Students should follow and complete the degree requirements as displayed in the bioengineering program Plan A or bioengineering program Plan B charts. Students who qualify for the accelerated premed program should follow the bioengineering Plan C chart.

Department of Chemical and Environmental Engineering

G. Glenn Lipscomb, chair

Degrees Offered

The department of chemical and environmental engineering offers an ABET-accredited program leading to the bachelor of science degree in chemical engineering (B.S.Ch.E.).

Chemical engineers apply the principles of chemistry, physics and mathematics to create high-value products from lower value raw materials. The curriculum provides a thorough grounding in basic and advanced chemistry, mathematics through differential equations, and engineering physics. These courses are a firm foundation for engineering courses that include thermodynamics, fluid mechanics, heat and mass transfer, separations, reactor design, process control and design. Additional courses in economics, communication skills, humanities, social sciences and various engineering electives broaden the curriculum and are capped by comprehensive chemical engineering design experiences.

The educational objectives of the chemical engineering program are that graduates will:

- Be prepared for professional careers in chemical engineering or to continue on with graduate or professional studies;
- Demonstrate effective problem-solving skills that will enable them to be successful professionals; and
- Be able to function effectively in a professional environment.

Chemical engineering graduates are in demand in many new and challenging fields. Chemical engineers are well suited to solve problems in many areas, including environmental engineering, polymers and materials engineering, renewable energy production, nuclear power, petrochemicals, fertilizers, new food sources, pharmaceuticals, improved refining and chemical processes, computer simulation, mathematical modeling, and bioengineering. Many students go on to graduate work in engineering, law, business and medicine. More information is available on the department Web site at *www.che.utoledo.edu*.

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Chemical Engineering Program -–Plan A or Plan B charts.

Chemical Engineering Program – Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	CHEE 1000 Orient & Comp for ChEE 3 CHEM 1230 General Chemistry I 4 CHEM 1280 General Chemistry Lab I 1 ENGL 1110 College Composition I 3 MATH 1850 Calculus I 4 **Total 15**	CHEE 1010 Professional Development 1 CHEE 2010 Mass & Energy Balances 3 CHEM 1240 General Chemistry II 4 CHEM 1290 General Chemistry Lab II 1 COMM 1010 Comm Prin & Prac 3 MATH 1860 Calculus II 4 **Total 16**	
Sophomore Year	CHEE 2230 ChE Thermo I 3 CHEM 2410 Organic Chemistry I 3 CHEM 2460 Organic Chemistry Lab I 1 MATH 2850 Multivariable Calc. 4 PHYS 2130 Engineering Physics I 5 **Total 16**	CHEE 3940-001 Co-Op Experience # 1	CHEE 2330 ChE Thermo II 3 CHEM 2420 Organic Chemistry II 3 CHEM 2470 Organic Chemistry Lab II 1 MATH 3860 Differential Equations 3 Free Elective 3 Hum./Soc. Sci./Multicultural Elective 3 **Total 16**
Pre-Junior Year	CHEE 3940-002 Co-Op Experience # 2	Advanced Chemistry Elective 3 CHEE 2110 Process Fluid Mechanics 3 CHEE 3030 Separation Processes 3 CHEE 3110 Heat Transfer 2 PHYS 2140 Engineering Physics II 5 **Total 16**	CHEE3940-003 Co-Op Experience # 3
Junior Year	Advanced Science Elective 3 CHEE 3120 Mass Transfer 3 CHEE 3300 Reactor Design 3 CHEE 4500 ChE Laboratory I 2 Engineering Elective 3 ENGL 2950 Sci & Tech Report Writing 3 **Total 17**	CHEE 3940-004 Co-Op Experience # 4 (Optional)	CHEE 4520 Proc Econ & Design 3 CIVE 1150 or EECS 2340 3 Engineering Elective 3 Hum/Soc Sci/Multicultural Elective 6 **Total 15**
Senior Year	Advanced Chemistry Elective 3 CHEE 3400 Process Dyn & Control 3 CHEE 4540 Chemical Eng Design 3 CHEE 4550 ChE Laboratory II 2 CHEE Elective 3 Hum/Soc Sci/Multicultural Elective 3 **Total 17**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Chemical Engineering Program – Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	CHEE 1000 Orient & Comp for ChEE 3 CHEM 1230 General Chemistry I 4 CHEM 1280 General Chemistry Lab I 1 ENGL 1110 College Composition I 3 MATH 1850 Calculus I 4 **Total 15**	CHEE 1010 Professional Development 1 CHEE 2010 Mass & Energy Balances 3 CHEM 1240 General Chemistry II 4 CHEM 1290 General Chemistry Lab II 1 COMM 1010 Comm Prin & Prac 3 MATH 1860 Calculus II 4 **Total 16**	
Sophomore Year	CHEE 2230 ChE Thermo I 3 CHEM 2410 Organic Chemistry I 3 CHEM 2460 Organic Chemistry Lab I 1 MATH 2850 Multivariable Calc 4 PHYS 2130 Engineering Physics I 5 **Total 16**	CHEE 2110 Process Fluid Mechanics 3 CHEE 2330 ChE Thermo II 3 CHEE 3110 Heat Transfer 2 CHEM 2420 Organic Chemistry II 3 CHEM 2470 Organic Chemistry Lab II 1 MATH 3860 Differential Equations 3 **Total 15**	CHEE 3940-001 Co-Op Experience # 1
Pre-Junior Year	Advanced Science Elective 3 CHEE 3030 Separation Processes 3 CHEE 3120 Mass Transfer 3 CHEE 3300 Reactor Design 3 PHYS 2140 Engineering Physics II 5 **Total 17**	CHEE 3940-002 Co-Op Experience # 2	CIVE 1150 or EECS 2340 3 Free Elective 3 Hum/Soc Sci/Multicultural Elective 9 **Total 15**
Junior Year	CHEE 3940-003 Co-Op Experience # 3	Advanced Chemistry Elective 3 CHEE 4500 ChE.Laboratory I 2 CHEE 4520 Proc Econ & Design 3 Engineering Elective 6 ENGL 2950 Sci & Tech Report Writing 3 **Total 17**	CHEE 3940-004 Co-Op Experience # 4 (Optional)
Senior Year	Advanced Chemistry Elective 3 CHEE 3400 Process Dyn & Control 3 CHEE 4540 Chemical Eng Design 3 CHEE 4550 ChE Laboratory II 2 CHEE Elective 3 Hum/Soc Sci/Multicultural Elective 3 **Total 17**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Electives

Free Electives

Three hours of free electives are required. Free electives are any courses at the University that broaden students' backgrounds in an area of interest. Courses that are considered remedial for engineering students may not be used to satisfy this requirement. For questions about this requirement, contact an academic adviser.

Engineering Electives

Twelve hours of engineering electives are required. Students must take CIVE 1150 Engineering Mechanics: Statics or EECS 2340 Electric Circuits for Non-Majors, and one elective (three hours) from the chemical and environmental engineering department. An additional six hours may be chosen from engineering courses offered in the College of Engineering. Recommended courses include CIVE 3610 Water Supply and Treatment, CIVE 3620 Air Pollution Engineering I, MIME 2600 Engineering Economics, MIME 4000 Engineering Statistics I, or any 4000-level chemical engineering elective course. Students should see the departmental Web page at *www.che.utoledo.edu* for a list of current courses and should consult their advisers before selecting engineering electives.

Advanced Chemistry and Science Electives

Nine hours of advanced science electives are required. Students may choose 3000/4000-level courses from the following departments: chemistry, physics, biology, and earth, ecological and environmental sciences. At least six hours of advanced chemistry are required. Students should select courses from recommended science sequences such as:

Biochemistry: (CHEM 3510/3520 Biochemistry I and II); BIOL 2170/2180 Fundamentals of Life Science II/Lab)

Environmental: (CHEM 3510/3610 Biochemistry I and Inorganic Chemistry I; EEES 4220 Environmental Geochemistry)

Physical: (CHEM 3740/3860 Physical Chemistry II and Advanced Lab I; CHEM 4980 Principles of Materials Science)

Analytical: (CHEM 3310/3360/3860/4300Analytical Chemistry, Analytical Chemistry Lab, Advanced Chemistry Lab I and Instrumental Analysis).

Additional courses that may be used to fulfill the advanced science requirement include:

EEES	4450	Hazardous Waste Management
EEES	3050/3060	Ecology & Ecology Lab
PHYS	3070	Quantum Physics for Engineers
CHEM	4980	Materials Science I
CHEE	4800	Polymer Science and Engineering
CHEE	4980	Polymeric Materials

Students should meet with the academic adviser to develop a course sequence that is tailored to the individual academic goals of their programs.

Environmental Engineering Electives

Industrial needs require that all chemical engineers be aware of environmental issues when designing new chemical facilities or modifying existing ones. The environmental option allows chemical engineering students to apply engineering principles in the development of environmentally conscious chemical processes. Greater background in the sciences is provided in this program to allow the environmental specialist increased flexibility in understanding the environmental impact of current or proposed new practices. Specific examples of existing concepts are provided to demonstrate current practice. The trend toward pollution prevention is emphasized.

Upon completion of these electives, the environmental chemical engineer will be able to analyze chemical processes for their environmental impact, suggest modifications to processes to minimize the production of wastes, and develop treatment alternatives. The environmental chemical engineer provides an important bridge between the process engineer and the waste treatment specialist.

The goals of this sequence are achieved through careful choice of the electives, without additional hours beyond those normally required for graduation. The sequence of recommended electives is:

Advanced Chemistry Electives:

CHEM	3510	Biochemistry I
CHEM	3610	Inorganic Chemistry I

Advanced Science Electives:

EEES	3050	Ecology
EEES	3060	Ecology Laboratory
EEES	4450	Hazardous Waste Management
EEES	4220	Environmental Geochemistry

Engineering Electives:

CIVE	3610	Water Supply and Treatment
CIVE	4680	Environmental Law

Students should see an adviser for more information about this option.

Polymer Engineering Electives

Polymers and plastics are extremely important materials. The volume of plastics used annually exceeds that of steel and aluminum. Chemical engineers with expertise in polymers and plastics are in demand. Concepts with which chemical engineers specializing in this area need to be familiar include polymer synthesis and chemistry, polymer processing (mixing, extrusion, blow molding and injection molding), and polymer blends and composites. The polymer engineering sequence will enable students to apply their engineering skills to this important field and gather the necessary experience and expertise to work in the polymer industry after graduation.

Recommended polymer engineering electives include:

CHEE	4800	Polymer Science & Engineering
CHEE	4980	Polymeric Materials

For a complete list of courses in the polymer engineering sequence, students should see their adviser or consult the departmental Web page at *www.che.utoledo.edu.*

Department of Civil Engineering

Ashok Kumar, chair

Degrees Offered

The department of civil engineering offers an ABET-accredited program leading to the bachelor of science degree in civil engineering (B.S.C.E.). A graduate of this program meets the requirements to sit for the exam leading to registration as a professional engineer.

Civil engineering can be considered as the composite of structural, geotechnical, environmental and transportation engineering. All involve the application of basic scientific principles to the planning, design and construction of public facilities.

The mission of the department of civil engineering is to advance civil engineering knowledge, solutions and practices through research and the education of civil engineers who have a balanced and integrated education; are creative, independent and practical thinkers; and are world-class leaders and designers. The department's goal is to prepare its students to be productive contributors to an increasingly technical society and to have an appreciation for the broader societal issues in which technical decisions are made.

This is achieved through a balanced curriculum of mathematics and physical sciences; fundamentals of engineering; specific courses in environmental, geotechnical, structural and transportation areas; and courses in humanities, social sciences and multicultural studies. Individual specialization is achieved through the selection of elective courses. The course of study culminates in a comprehensive senior design project.

Each student is taught to apply basic scientific principles to the planning, design and construction of public facilities. Students are expected to gain a broad understanding of technical fundamentals, to increase problem-solving skills, and to develop professional attitudes and abilities. Through laboratory experiences, students are able to make measurements on and to interpret data obtained from physical phenomena. Opportunities for students to work on a variety of group projects, to prepare written reports, and to make oral presentations are used to develop communication skills and teamwork.

The cooperative education experiences of students provide them with real-world work experiences that introduce them to the practice of civil engineering, while placing their academic studies in a realistic context with social and fiscal constraints. Graduates of the civil engineering program are prepared for positions of increasing responsibility, and ultimately leadership, as practicing civil engineers in industry and government agencies. Students also develop an appreciation of the need for continued, life-long learning to keep pace with the rapidly expanding body of knowledge available to them. B.S.C.E. program graduates have the preparation needed for continued study in graduate school or other forms of continued learning.

To summarize, the educational objectives of the program are:

- Graduates who will pursue professional employment, obtain a position in civil engineering or related engineering field, and be successful in that position;
- Graduates who will demonstrate continuing professional development; and
- Graduates who will successfully pursue further study.

More information is available on the departmental Web site at *www.eng.utoledo.edu/civil*.

Degree Requirements

Students should follow and complete the degree requirements as displayed in the civil engineering program Plan A or the civil engineering program Plan B charts.

Electives

Each civil engineering student selects electives from four general areas – at least 15 credit hours in the humanities, social sciences and multicultural studies; at least three credit hours in college composition; at least three credit hours in fundamentals of engineering; and at least six credit hours of technical electives. Recommended lists of college composition, fundamentals of engineering and technical electives are given below. Technical electives not listed below must be at the 3000- or 4000-level and must be approved by the student's adviser. At least three credit hours of technical electives should be chosen from within the civil engineering department. An introductory accounting course (e.g. BUAD 2040) can be considered as a technical elective if the requirements for a business minor are completed.

College Composition Electives

ENGL	2950	Scientific and Technical Report Writing
ENGL	2960	Organizational Report Writing

Fundamentals of Engineering Electives

EECS	2340	Electric Circuits for Nonmajors
MIME	1650	Materials Science & Engineering
MIME	3400	Thermodynamics I

Technical Electives

Structural Engineering (Analysis)

CIVE	3320	Basic Finite Element Methods
CIVE	4300	Advanced Mechanics of Materials
CIVE	4320	Matrix Analysis of Structures
CIVE	4340	Experimental Mechanics
CIVE	4350	Introduction to Structural Dynamics

Structural Engineering (Design)

CIVE	4410	Timber Design
CIVE	4430	Structural Steel Design II
CIVE	4440	Reinforced Concrete Design II
CIVE	4480	Reinforced Masonry Design

Environmental Engineering

EEES	4410	Hydrogeology
CIVE	4610	Hydrology and Water Resources
CIVE	4620	Open Channel Flow Hydraulics
CIVE	4630	Indoor Air Quality
CIVE	4640	Industrial Hygiene
CIVE	4650	Industrial Ventilation
CIVE	4660	Pollution Laboratory
CIVE	4670	Solid Waste Management and Disposal
CIVE	4680	Environmental Law

Transportation Engineering

GEPL	4530	Principles of Urban Planning
CIVE	4510	Materials Engineering
CIVE	4550	Traffic Control
CIVE	4580	Introduction to Intelligent Transportation Systems

Geotechnical Engineering

EEES	3250	Engineering Geology
EEES	3320	Structural Geology
EEES	4610	Introduction to Geophysics
CIVE	4210	Advanced Soil Mechanics
CIVE	4220	Advanced Foundation Engineering
CIVE	4240	Design With Geosynthetics
CIVE	4260	Experimental Soil Mechanics

Other Technical Electives

CIVE	4710	Advanced Engineering Systems Analysis
CIVE	4810	Contracts and Specifications
CIVE	4820	Project Management
CIVE	4830	Engineering Ethics and Professionalism
CIVE	4840	GIS for Civil Engineering
CIVE	4900	Seminars in Civil Engineering
CIVE	4960	Honors Thesis Research

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Civil Engineering Program -–Plan A or Plan B charts.

Civil Engineering Program - Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	CIVE 1000 Freshman Civil Eng. Exp. 1 cr. CIVE 1100 Msmts & CAD for Civil Eng. 4 cr. MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 Chemistry Lab I 1 cr. ENGL 1110 College Composition I 3 cr. **Total 17 hours**	CIVE 2000 Professional Development 1 cr. MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Engineering Physics I 5 cr. ENGL 2950 or 2960 Report Writing. 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**	
Sophomore Year	MATH 2890 Numerical Meth & Linear Alg 3 cr. MATH 2850 Elem. Multivariable Calculus 4 cr. PHYS 2140 Engineering Physics II 5 cr. CIVE 1150 Engineering Statics 3 cr. EECS 1050 Intro to Computing in C/C++ 2 cr. **Total 17 hours**	CIVE 3940-001 Co-Op Experience # 1	MATH 3860 Differential Equations 3 cr. CIVE 1160 Mechanics of Materials 3 cr. CIVE 1170 Fluid Mech. For Civil Engr. 3 cr. MIME 2300 Engineering Dynamics 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 15 hours**
Pre-Junior Year	CIVE 3940-002 Co-Op Experience # 2	CIVE 2110 Civil Engr. Materials with Lab 3 cr. CIVE 3120 Civil Engr. Systems Analysis 3 cr. CIVE 3310 Structural Analysis 3 cr. CIVE 3630 Wastewater Engineering 3 cr. CIVE 3620 Air Pollution Engineering I 3 cr. Fundamentals of Engineering Elective 3 cr. **Total 18 hours**	CIVE 3940-003 Co-Op Experience # 3
Junior Year	CIVE 3210 Soil Mechanics 3 cr. CIVE 3510 Transportation Engineering 3 cr. CIVE 3420 Reinforced Concrete Design I 3 cr. CIVE 3610 Water Supply and Treatment 3 cr. MIME 2600 Engineering Economics 3 cr. **Total 15 hours**	CIVE 3940-004 Co-Op Experience # 4	CIVE 3220 Foundation Engineering 3 cr. CIVE 3410 Steel Design I 3 cr. CIVE 3520 Transportation Engineering II 3 cr. MIME 4000 Engineering Statistics 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 15 hours**
Senior Year	CIVE 4750 Senior Design Project 3 cr. Technical Electives 6 cr. Hum./Soc. Sci./Multicultural Elective 6 cr. **Total 15 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Civil Engineering Program – Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 Chemistry Lab I 1 cr. ENGL 1110 College Composition I 3 cr. CIVE 1000 Freshman Civil Eng. Exper. 1 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**	CIVE 1100 Msmts & CAD for Civil Engr. 4 cr. CIVE 2000 Professional Development 1 cr. MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Engineering Physics I 5 cr. ENGL 2950 or 2960 Report Writing. 3 cr. **Total 17 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calculus 4 cr. MATH 2890 Numerical Meth & Linear Alg 3 cr. PHYS 2140 Engineering Physics II 5 cr. CIVE 1150 Engineering Statics 3 cr. EECS 1050 Intro to Computing in C/C++ 2 cr. **Total 17 hours**	MATH 3860 Differential Equations 3 cr. CIVE 1160 Mechanics of Materials 3 cr. CIVE 1170 Fluid Mech. For Civil Engr. 3 cr. MIME 2300 Engineering Dynamics 3 cr. Fundamentals of Engineering Elective 3 cr. **Total 15 hours**	CIVE 3940-001 Co-Op Experience # 1
Pre-Junior Year	CIVE 2110 Civil Engr. Materials w/ Lab 3 cr. CIVE 3210 Soil Mechanics 3 cr. CIVE 3310 Structural Analysis 3 cr. CIVE 3510 Transportation Engineering I 3 cr. CIVE 3610 Water Supply and Treatment 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 18 hours**	CIVE 3940-002 Co-Op Experience # 2	CIVE 3220 Foundation Engineering 3 cr. CIVE 3410 Steel Design I 3 cr. CIVE 3520 Transportation Engineering II 3 cr. MIME 4000 Engineering Statistics 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 15 hours**
Junior Year	CIVE 3940-003 Co-Op Experience # 3	CIVE 3420 Reinforced Concrete Design 3 cr. CIVE 3120 Civil Engr Systems Analysis 3 cr. CIVE 3620 Air Pollution Engineering 3 cr. CIVE 3630 Wastewater Engineering 3 cr. Technical Elective 3 cr. **Total 15 hours**	CIVE 3940-004 Co-Op Experience # 4
Senior Year	CIVE 4750 Senior Design Project 3 cr. MIME 2600 Engineering Economics 3 cr. Technical Elective 3 cr. Hum./Soc. Sci./Multicultural Electives 6 cr. **Total 15 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Department of Electrical Engineering and Computer Science

Roger J. King, interim chair

Degrees Offered

Two degree programs are offered through the department of electrical engineering and computer science – the bachelor of science in computer science and engineering (C.S.E.) and the bachelor of science in electrical engineering (E.E.). These programs rely on a common scientific and mathematical foundation and possess common interests in electric circuits, electronics, signals and systems and computer-based systems. The C.S.E. program places greater emphasis on computer science and computer-related applications, including computer systems design, programming languages, networking and software engineering. The E.E. program emphasizes computer hardware, electrical principles and related applications, such as electronics design, microelectronics, energy systems, automatic control systems, signal analysis and communications. Both programs are accredited by the Engineering Accreditation Commission (EAC) of ABET. The C.S.E. degree also is accredited by the Computing Accreditation Commission (CAC) of ABET.

All engineering programs require humanities, social sciences and multicultural core electives. More detailed information is available in the departmental office and also may be accessed using the departmental Web page at *www.eecs.utoledo.edu.*

Advanced Placement

Students with a score of 3, 4 or 5 on the Computer Science A test receive credit for EECS 1560 (3 hours).

Computer Science and Engineering Degree Requirements

The educational objectives of the computer science and engineering program are:

- Graduates who will possess a strong foundation in computer science and computer engineering;
- Graduates who will be employable in the computer science and computer engineering professions;
- Graduates who will perform professionally and ethically in the workplace; and
- Graduates who will be well-prepared to pursue graduate studies.

The College of Engineering has instituted a co-op program that requires three or more work experiences. Students should follow and complete the degree requirements as displayed in the computer science and engineering program Plan A or Plan B charts. Students should consult their advisers for additional information.

The curriculum has a requirement of nine hours of professional electives. Students are required to develop a plan of study for the professional elective courses with their C.S.E. program adviser. The combination of electives selected and required advanced courses (EECS 2550 Operating Systems and Systems Programming, EECS 3550 Software Engineering, EECS 3100 Microsystems Design, EECS 3150 Data Communications and EECS 3500 Automata and Language Translation Systems) provide in-depth coverage of at least three advanced C.S.E. specialization areas.

A current list of approved professional electives for the program may be obtained from the departmental office or from the departmental Web page at *www.eecs.utoledo.edu.*

The humanities/fine arts/social science/multicultural electives must be chosen so they complete the University Core Curriculum and the requirements of the College of Engineering. In addition, the C.S.E. program has two breadth electives (6 credit hours). These courses must not be computer or engineering related. Students should check with their advisers if they have any questions on these courses.

Electrical Engineering Degree Requirements

The educational objectives of the electrical engineering program are:

- Graduates who will have the ability to engage in a successful professional career in electrical engineering; and
- Graduates who will be equipped for lifelong contribution to the electrical engineering profession.

The College of Engineering has instituted a co-op program that requires three or more work experiences. Students should follow and complete the degree requirements as displayed in the electrical engineering program Plan A or Plan B charts. Students should consult their advisers for additional information.

The curriculum has a requirement of 12 hours of technical electives. Students are required to develop a plan of study for the technical elective courses with the E.E. program adviser. A list of suggested technical electives for the program may be obtained from the departmental office or from the departmental Web page at *www.eecs.utoledo.edu.*

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Computer Science and Engineering Program–Plan A or Plan B charts. Students should consult an advisor for additional information.

Computer Science and Engineering Program – Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	PHIL 1010 Intro to Logic 3 cr. MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. EECS 1000 Orientation to EECS 1 cr. EECS 1560 Intro. to Obj. Orient. Prog. 3 cr. **Total 15 hours**	MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Physics for Sci & Eng. I 5 cr. EECS 2000 Professional Development 1 cr. EECS 1100 Digital Logic Design 4 cr. EECS 1570 Linear Data Structures 3 cr. **Total 17 hours**	
Sophomore Year	ENGL 1110 College Composition I 3 cr. MATH 2850 Elem. Multivariable Calc. 4 cr. PHYS 2140 Physics for Sci & Eng. II 5 cr. EECS 2100 Comp Org & Assembly 4 cr. **Total 16 hours**	EECS 3940:001 Co-Op Experience # 1	MATH 3860 Elem Differential Equations 3 cr. MATH 2890 Numeric Meth & Linear Alg 3 cr. EECS 1580 Nonlinear Data Structures 3 cr. EECS 1590 Discrete Structures 3 cr. EECS 2300 Electric Circuits 4 cr. **Total 16 hours**
Pre-Junior Year	EECS 3940:002 Co-Op Experience # 2	ENGL 2960 Organizational Report Writing or ENGL 2950 Sci & Tech Report Wrtg 3 cr. EECS 2550 Operating Systems 3 cr. EECS 3400 Electronics I 4 cr. EECS 3200 Signals & Systems 4 cr. MIME 4000 Engineering Statistics I 3 cr. **Total 17 hours**	EECS 3940:003 Co-Op Experience # 3
Junior Year	EECS 3150 Data Communication 3 cr. MIME 3400 Thermodynamics I or CIVE 1150 Statics 3 cr. EECS 3100 Microsystem Design 4 cr. EECS 3500 Automata & Lang. Trans. 3 cr. ECON 1200 Microeconomics or ECON 1150 Macroeconomics 3 cr. **Total 16 hours**	Hum/Soc/Multicultural Electives 6 cr. Breadth Elective 3 cr. EECS Professional Elective 3 cr. EECS 3550 Software Engineering 3 cr. **Total 15 hours**	EECS 3940:004 Co-Op Experience # 4
Senior Year	Hum/Soc/Multicultural Electives 3 cr. Breadth Elective 3 cr. EECS Professional Electives 6 cr. EECS 4000 Senior Design Project 4 cr. **Total 16 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Computer Science and Engineering Program - Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	PHIL 1010 Intro to Logic 3 cr. MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. EECS 1000 Orientation to EECS 1 cr. EECS 1560 Intro. to Obj. Orient. Prog. 3 cr. **Total 15 hours**	MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Physics for Sci & Eng. I 5 cr. EECS 2000 Professional Development 1 cr. EECS 1100 Digital Logic Design 4 cr. EECS 1570 Linear Data Structures 3 cr. **Total 17 hours**	
Sophomore Year	ENGL 1110 College Composition I 3 cr. MATH 2850 Elem. Multivariable Calc. 4 cr. PHYS 2140 Physics for Sci & Eng. II 5 cr. EECS 2100 Comp Org & Assembly 4 cr. **Total 16 hours**	MATH 3860 Elem Differential Equations 3 cr. MATH 2890 Numeric Meth & Linear Alg 3 cr. EECS 1580 Nonlinear Data Structures 3 cr. EECS 1590 Discrete Structures 3 cr. EECS 2300 Electric Circuits 4 cr. **Total 16 hours**	EECS 3940:001 Co-Op Experience # 1
Pre-Junior Year	ENGL 2960 Organizational Report Writing or ENGL 2950 Sci & Tech Report Wrtg 3 cr. EECS 2550 Operating Systems 3 cr. EECS 3400 Electronics I 4 cr. EECS 3200 Signals & Systems 4 cr. EECS 3500 Automata & Lang. Trans. 3 cr. **Total 17 hours**	EECS 3940:002 Co-Op Experience # 2	EECS 3150 Data Communication 3 cr. MIME 3400 Thermodynamics I or CIVE 1150 Statics 3 cr. EECS 3100 Microsystem Design 4 cr. MIME 4000 Engineering Statistics I 3 cr. ECON 1200 Microeconomics or ECON 1150 Macroeconomics 3 cr. **Total 16 hours**
Junior Year	EECS 3940:003 Co-Op Experience # 3	Hum/Soc/Multicultural Electives 6 cr. Breadth Elective 3 cr. EECS Professional Elective 3 cr. EECS 3550 Software Engineering 3 cr. **Total 15 hours**	EECS 3940:004 Co-Op Experience # 4
Senior Year	Hum/Soc/Multicultural Electives 3 cr. Breadth Elective 3 cr. EECS Professional Electives 6 cr. EECS 4000 Senior Design Project 4 cr. **Total 16 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Electrical Engineering Program -–Plan A or Plan B charts. Students should consult an advisor for additional information

Electrical Engineering Program – Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry 4 cr. ENGL 1110 College Composition I 3 cr. EECS 1000 Orientation to EECS 1 cr. EECS 1100 Digital Logic Design 4 cr. **Total 16 hours**	MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Physics for Sci & Eng. I 5 cr. EECS 2000 Professional Development 1 cr. EECS 1530 Intro. to Programming 3 cr. ENGL 2950 Tech Writing *or* ENGL 2960 Org. Report Writing 3 cr. **Total 16 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calc. 4 cr. PHYS 2140 Physics for Sci & Eng. II 5 cr. EECS 2100 Comp Org & Assembly 4 cr. ECON 1200 Microeconomics 3 cr. **Total 16 hours**	EECS 3940:001 Co-Op Experience # 1	MATH 3860 Elem Differential Equations 3 cr. MATH 2890 Num. Methods & Linear Alg 3 cr. EECS 2300 Electric Circuits 4 cr. Hum/Soc. Sci./Multicultural Elective 6 cr. **Total 16 hours**
Pre-Junior Year	EECS 3940:002 Co-Op Experience # 2	EECS 3400 Electronics I 4 cr. EECS 3200 Signals & Systems 4 cr. EECS 3700 Electromagnetics 4 cr. MIME 3400 Thermodynamics I *or* CIVE 1150 Statics 3 cr. **Total 15 hours**	EECS 3940:003 Co-Op Experience #3
Junior Year	EECS 3100 Microsystems Design 4 cr. EECS 3300 Probabilistic Methods 3 cr. EECS 3420 Electronics II 3 cr. EECS 3460 Energy Conversion 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**	EECS 3440 Electronic Lab 1 cr. EECS 4360 Communication Systems 3 cr. EECS 4200 Feedback Control Systems 3 cr. EECS 4130 Digital Design 4 cr. EECS Technical Electives 6 cr. **Total 17 hours**	EECS 3940:004 Co-Op Experience # 4
Senior Year	EECS 4000 Senior Design 4 cr. EECS 4480 Elec. Energy Process 3 cr. EECS Technical Electives 6 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Electrical Engineering Program – Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry 4 cr. ENGL 1110 College Composition I 3 cr. EECS 1000 Orientation to EECS 1 cr. EECS 1100 Digital Logic Design 4 cr. **Total 16 hours**	MATH 1860 Single Variable Calculus II 4 cr. PHYS 2130 Physics for Sci & Eng. I 5 cr. EECS 2000 Professional Development 1 cr. EECS 1530 Introduction to Progrmming 3 cr. ENGL 2950 or 2960 Report Writing 3 cr. **Total 16 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calc. 4 cr. PHYS 2140 Physics for Sci & Eng. II 5 cr. EECS 2100 Comp Org & Assembly 4 cr. ECON 1200 Microeconomics 3 cr. **Total 16 hours**	MATH 3860 Elem Differential Equations 3 cr. MATH 2890 Num. Methods & Linear Alg 3 cr. EECS 2300 Electric Circuits 4 cr. Hum./Soc. Sci./Multicultural Electives 6 cr. **Total 16 hours**	EECS 3940:001 Co-Op Experience # 1
Pre-Junior Year	EECS 3400 Electronics I 4 cr. EECS 3200 Signals & System 4 cr. EECS 3700 Electromagnetics 4 cr. MIME 3400 Thermodynamics I *or* CIVE 1150 Statics 3 cr. **Total 15 hours**	EECS 3940:002 Co-Op Experience # 2	EECS 3300 Probabilistic Methods 3 cr. EECS 3420 Electronics II 3 cr. EECS 3460 Energy Conversion 3 cr. EECS 3100 Microsystems Design 4 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**
Junior Year	EECS 3940:003 Co-Op Experience #3	EECS 3440 Electronic Lab 1 cr. EECS 4360 Communication Systems 3 cr. EECS 4200 Feedback Control Systems 3 cr. EECS 4130 Digital Design 4 cr. EECS Technical Electives 6 cr. **Total 17 hours**	EECS 3940:004 Co-Op Experience # 4
Senior Year	EECS 4000 Senior Design 4 cr. EECS 4480 Elec. Energy Process 3 cr. EECS Technical Electives 6 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 16 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Department of Mechanical, Industrial and Manufacturing Engineering

Abdollah A. Afjeh, chair

Degrees Offered

The department of mechanical, industrial and manufacturing engineering (MIME) offers ABET-accredited programs leading to the bachelor of science in industrial engineering (B.S.I.E.) and bachelor of science in mechanical engineering (B.S.M.E.) degrees.

The goal of the B.S.I.E. and B.S.M.E. programs is to prepare students for successful professional careers in their chosen fields of study, with emphasis on industrial or mechanical and/or manufacturing engineering. The department fulfills this goal through a carefully constructed, effectively implemented and continuously evolving curriculum that satisfies the detailed incremental objectives leading to appropriate terminal objectives. This is accomplished by providing technical knowledge, increasing creative skills and developing professional attitudes through courses designed with a balance of mathematics, basic sciences, fundamental and specialized engineering courses, humanities/fine arts, social science and multiculturalism.

Industrial engineering deals with the development of better ways to cost effectively produce products with improved quality, safety and reliability, as well as determine the most efficient way to perform tasks needed in the business world. This is an exciting and broad field involving high-level technology, manufacturing systems, management and people. Specifically, the program's educational objectives are that students graduating from the industrial engineering program in the mechanical, industrial and manufacturing engineering department will be individuals who:

- Possess the skill set to be successful in the industrial engineering profession;
- Have the broader educational experience that will permit them to pursue other career opportunities; and
- Continue to grow intellectually in technical and non-technical areas.

Mechanical engineering deals with design, computer-aided design, development, manufacturing, testing, research, maintenance, applications and sales. Mechanical engineering is the largest field in engineering, employing over one-fourth of all engineers. This broad and diverse field also provides a strong foundation for pursuing a law, business or medical degree and affords many advantages in the professional world. Specifically, our program educational objectives are that students graduating from the mechanical engineering program in the mechanical, industrial and manufacturing engineering department will be individuals who:

- Possess the skill set to be successful in the mechanical engineering profession;
- Have the broader educational experience that will permit them to pursue other career opportunities; and
- Continue to grow intellectually in technical and non-technical areas.

Degree Requirements

Bachelor of Science in Industrial Engineering

Students should follow and complete the degree requirements as displayed in the Plan A chart for the industrial engineering program. By carefully selecting courses, students may be able to complete degree requirements in less time than indicated in the Plan A chart.

Bachelor of Science in Mechanical Engineering

Students should follow and complete the degree requirements as displayed in the Plan A or Plan B charts for the mechanical engineering program. By carefully selecting courses, students may be able to complete degree requirements in less time than indicated in the Plan A or Plan B chart.

Technical Electives

For technical elective courses, MIME undergraduate students are to select from the following list of courses, as well as additional approved MIME courses. MIME students may take one course from an approved list of courses in another engineering program, or from the department of mathematics, physics or chemistry, or from the College of Business Administration. See the MIME academic adviser for details.

MIME	4210	Vehicle Dynamics	3
MIME	4230	Dynamics of Human Movement	3
MIME	4270	CAD-Geometric Modeling	3
MIME	4280	CAD-Finite Element Methods	3
MIME	4300	Advanced Mechanics of Materials	3
MIME	4310	Mechanics of Composite Materials	3
MIME	4320	Fatigue of Materials & Structures	3
MIME	4330	Occupational Ergonomics	3
MIME	4340	Experimental Mechanics	3
MIME	4510	Turbomachinery	3
MIME	4520	Heating, Ventilating & Air Conditioning	3
MIME	4530	Internal Combustion Engines	3
MIME	4540	Jet Propulsion	3
MIME	4550	Aerodynamics	3
MIME	4560	Gas Dynamics	3
MIME	4580	Design of Thermal Systems	3
MIME	4590	Lubrication Technology & Bearing Design	3
MIME	4640	Random Processes	3
MIME	4690	Reliability	3
MIME	4730	Forecasting	3
MIME	4780	Adv Engrg Economy & Decision Theory	3
MIME	4800	Design for Manufacturability	3
MIME	4810	Material Removal Processes	3

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Industrial Engineering Program – Plan A Chart

Industrial Engineering Program – Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. ENGL 1110 College Composition I 3 cr. MIME 1000 Orientation to ME and IE 3 cr. MIME 1100 Introduction to CAD 2 cr. **Total 16 hours**	MATH 1860 Single Variable Calculus II 4 cr. MIME 1010 Professional Development 1 cr. MIME 1650 Materials Science & Engr. 3 cr. PHYS 2130 Engineering Physics I 5 cr. ENGL 1930 Tech. Writing for Engineers 1 cr. **Total 16 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calculus 4 cr. PHYS 2140 Engineering Physics II 5 cr. CIVE 1150 Engineering Statics 3 cr. MIME 2650 Manufacturing Processes 3 cr. **Total 15 hours**	MIME 3940-001 Co-Op Experience # 1	MATH 3860 Differential Equations 3 cr. MATH 2890 Num Methods & Linear Alg. 3 cr. MIME 4000 Engineering Statistics I 3 cr. MIME 2300 Engineering Dynamics 3 cr. PSY 1010 Principles of Psychology 3 cr. **Total 15 hours**
Pre-Junior Year	MIME 3940-002 Co-Op Experience # 2	MIME 2600 Engineering Economics 3 cr. MIME 4050 Human Factors Engineering 3 cr. MIME 4080 Operations Research I 3 cr. MIME 4010 Engineering Statistics II 3 cr. MIME 4100 Manuf. System Simulation 3 cr. **Total 15 hours**	MIME 3940-003 Co-Op Experience # 3
Junior Year	MIME 3710 Work Design & Measurement 3 cr. MIME 4060 Manufacturing Engineering 3 cr. MIME 4070 Computer Aided Manuf. 3 cr. MIME 4090 Operations Research II 3 cr. EECS 2340 Elect Circuits for Non-Majors 3 cr. **Total 15 hours**	MIME 3780 Engineering Management 3 cr MIME 4110 Prod. Planning & Inv. Control 3 cr. MIME 4160 Facilities Planning 3 cr. Technical Elective 3 cr. Hum/Soc. Sci. Electives 6 cr. **Total 18 hours**	MIME 3940-004 Co-Op Experience # 4
Senior Year	MIME 4020 Stat. Q. C. & Management 3 cr. MIME 4200 Senior Design Projects 3 cr. Technical Electives 6 cr. Multicultural Electives 6 cr. **Total 18 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Degree Requirements
Students should follow and complete the degree requirements as displayed in the Mechanical Engineering Program -–Plan A or Plan B charts.

Mechanical Engineering Program - Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. ENGL 1110 College Composition I 3 cr. MIME 1000 Orientation to ME and IE 3 cr. MIME 1100 Introduction to CAD 2 cr. **Total 16 hours**	MATH 1860 Single Variable Calculus II 4 cr. MIME 1010 Professional Development 1 cr. MIME 1650 Materials Science & Engr. 3 cr. PHYS 2130 Engineering Physics I 5 cr. ENGL 1930 Tech. Writing for Engineers 3 cr. **Total 16 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calculus 4 cr. PHYS 2140 Engineering Physics II 5 cr. CIVE 1150 Engineering Statics 3 cr. MIME 2650 Manufacturing Processes 3 cr. **Total 15 hours**	MIME 3940-001 Co-Op Experience # 1	MATH 3860 Differential Equations 3 cr. MATH 2890 Num. Methods & Linear Alg. 3 cr. CIVE 1160 Mechanics of Materials 3 cr. MIME 2000 Statistics & Meas. Lab 2 cr. MIME 2300 Engineering Dynamics 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 17 hours**
Pre-Junior Year	MIME 3940-002 Co-Op Experience # 2	MIME 2600 Engineering Economics 3 cr. MIME 3300 Design Anal - Mech. Sys. 3 cr. MIME 3310 Mechanical Design I 3 cr. MIME 3400 Thermodynamics I 3 cr. EECS 2340 Elect. Circuits for Non-Majors 3 cr. **Total 15 hours**	MIME 3940-003 Co-Op Experience # 3
Junior Year	EECS 3450 Elect. & Electronic Devices 3 cr. MIME 3320 Mechanical Design II 3 cr. MIME 3370 Vibration & Control 3 cr. MIME 3410 Thermodynamics II 3 cr. MIME 3430 Fluid Mechanics 3 cr. Hum./Soc. Sci/Multicultural Elective 3 cr. **Total 18 hours**	MIME 3940-004 Co-Op Experience # 4	MIME 3440 Heat Transfer 3 cr. Hum./Soc. Sci./Multicultural Elective 6 cr. Technical Electives 6 cr. **Total 15 hours**
Senior Year	MIME 3390 Mechanics & Vibrations Lab 2 cr. MIME 3470 Thermal Science Lab 2 cr. MIME 4200 Senior Design Projects 3 cr. Technical Electives 6 cr. Hum./Soc. Sci./Multicultural Electives 3 cr. **Total 16 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Mechanical Engineering Program – Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1850 Single Variable Calculus I 4 cr. CHEM 1230 General Chemistry I 4 cr. ENGL 1110 College Composition I 3 cr. MIME 1000 Orientation to ME and IE 3 cr. MIME 1100 Introduction to CAD 2 cr. **Total 16 hours**	MATH 1860 Single Variable Calculus II 4 cr. MIME 1010 Professional Development 1 cr. MIME 1650 Materials Science & Engr. 3 cr. PHYS 2130 Engineering Physics I 5 cr. ENGL 1930 Tech. Writing for Engineers 3 cr. **Total 16 hours**	
Sophomore Year	MATH 2850 Elem. Multivariable Calculus 4 cr. PHYS 2140 Engineering Physics II 5 cr. CIVE 1150 Engineering Statics 3 cr. MIME 2650 Manufacturing Processes 3 cr. **Total 15 hours**	MATH 3860 Differential Equations 3 cr. MATH 2890 Num. Methods & Linear Alg. 3 cr. CIVE 1160 Mechanics of Materials 3 cr. MIME 2000 Statistics & Meas. Lab 2 cr. MIME 2300 Engineering Dynamics 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 17 hours**	MIME 3940-001 Co-Op Experience # 1
Pre-Junior Year	MIME 2600 Engineering Economics 3 cr. MIME 3300 Design Anal - Mech. Sys. 3 cr. MIME 3310 Mechanical Design I 3 cr. MIME 3400 Thermodynamics I 3 cr. EECS 2340 Elect. Circuits for Non-Majors 3 cr. **Total 15 hours**	MIME 3940-002 Co-Op Experience # 2	MIME 3320 Mechanical Design II 3 cr. MIME 3370 Vibration & Control 3 cr. MIME 3410 Thermodynamics II 3 cr. MIME 3430 Fluid Mechanics 3 cr. Hum./Soc. Sci./Multicultural Elective 3 cr. **Total 15 hours**
Junior Year	MIME 3940-003 Co-Op Experience # 3	EECS 3450 Elect. & Electronic Devices 3 cr. MIME 3440 Heat Transfer 3 cr. MIME 3390 Mechanics & Vibrations Lab 2 cr. MIME 3470 Thermal Science Lab 2 cr. MIME 4200 Senior Design Projects 3 cr. Technical Elective 3 cr. **Total 16 hours**	MIME 3940-004 Co-Op Experience # 4
Senior Year	Technical Electives 9 cr. Hum./Soc. Sci./Multicultural Electives 9 cr. **Total 18 hours**	Course work for deficiencies, business administration minor, graduate study or additional co-op experience.	

Engineering Technology Programs

Accreditation

The bachelor's programs in computer science and engineering technology, construction engineering technology, mechanical engineering technology and electrical engineering technology are accredited by the Technology Accreditation Commission (TAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, Telephone: 410.347.7700.

Engineering Technology Degree Programs

The department of engineering technology offers programs of study leading to the bachelor of science degree in engineering technology (B.S.E.T.) in computer science and engineering technology, construction engineering technology, electrical engineering technology and mechanical engineering technology. Associate of applied science programs in construction engineering technology, electrical engineering technology and mechanical engineering technology will be supported through the spring semester of 2007 for students enrolled in the programs as of fall 2004.

Articulation Agreements

A total of 128 hours of course credit is required for the B.S.E.T. degree. A total of 65 to 68 hours of course credit is required for an A.A.S., depending on the selected program of study. Normally, 64 hours of the baccalaureate program may be transferred from an accredited community or technical college. Additional transfer credits may be applied over the 64-semester hour limit at the discretion of the undergraduate program director. In addition, articulation agreements with the following institutions will continue:

Central Ohio Technical College
Cincinnati State Technical and Community College
Columbus State Community College
Cuyahoga Community College
Edison Community College
Lakeland Community College
Lima Technical College
Lorain County Community College
Marion Technical College
Monroe County Community College
North Central Technical College
Northwest State Community College
Owens State Community College
Stark State College of Technology
Terra Community College
Washtenaw Community College

Degrees Offered

The TAC of ABET defines engineering technology as a distinct field of study related to the profession of engineering – "Engineering technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities: it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer." The term "engineering technician" is applied to the graduates of associate's degree programs. Graduates of baccalaureate programs are called "engineering technologists." In industry, job titles with the term "engineer" are common for engineering technology graduates. Engineering technology education is based on sound foundations in applied sciences and mathematics. The curriculum emphasizes basic principles, applications and extensive laboratory experience.

The B.S.E.T. degree does not prepare its graduates for advanced study in traditional engineering programs. B.S.E.T. degree graduates can pursue the college's part-time master of science in engineering (after obtaining employment) or pursue graduate degrees in other colleges at The University of Toledo and elsewhere.

Minor in Business Administration

Engineering technology students may earn a minor in business administration by earning a C or better in six business courses, plus at least one economics course. The economics requirement is satisfied with ECON 1150 and 1200. The six business courses must include BUAD 2040 and should be chosen according to the rules in this catalog in the College of Business Administration section. For students whose goal is to earn an M.B.A., the following six courses are recommended:

BUAD 2040	Financial Accounting Information
BUAD 2050	Accounting for Business Decision Making
BUAD 3010	Principles of Marketing
BUAD 3020	Principles of Manufacturing and Service Systems
BUAD 3030	Managerial and Behavioral Processes in Organizations
BUAD 3040	Principles of Financial Management

Students not interested in an M.B.A. may wish to make substitutions in this list. For example, IBUS 3150, Understanding Cultural Differences for Business, could be used in place of any of the above courses except BUAD 2040 to also satisfy part of the multicultural requirement in the University Core Curriculum. Students must be sophomores to take the 2000-level business courses and juniors to take the 3000-level courses. Also, BUAD 2040 must be taken before BUAD 3040, and the economics requirement must be satisfied before taking BUAD 3010. Otherwise, business prerequisites are waived for engineering students. Students should register with the College of Business Administrationto become candidates for the business minor.

Students in engineering technology programs may use one or more of the business courses as professional development electives. Students interested in a business minor should consult an adviser in both the College of Business Administration and the College of Engineering.

Joint B.S.E.T./M.B.A. Program

The College of Business Administration, in conjunction with the College of Engineering, offers a program whereby a student may simultaneously earn a B.S. in engineering technology and a master of business administration (M.B.A.). This program provides a unique opportunity to combine business and engineering skills to prepare graduates for global competitiveness. It supports the mission to prepare corporate leaders for the future and is thought to be a one-of-a kind-program in the state of Ohio. The program should be particularly attractive to students who want to start their own companies or who simply want to develop an appreciation for how engineering and business complement each other.

To be admitted to the program, students must have senior standing, score a minimum of 450 on the Graduate Management Admissions Test (GMAT), and have a minimum cumulative GPA of 3.0. Students also must have com-

pleted the requirements for the business minor, but courses should be chosen carefully, as not all business minor courses can be used towards the M.B.A. The six business courses listed in the business minor section, plus MIME 2600 or ECON 1150 and 1200, satisfy the basic core prerequisite requirement for the M.B.A. program for engineering technology students.

Students who wish to pursue the program should inform the associate dean of undergraduate studies in the College of Engineering during their junior year and complete the Graduate Management Admissions Test (GMAT) by the end of their junior year. Students should submit completed application materials to the Graduate School for admission to the M.B.A. program **before** fall semester of their senior year. Upon admission to the program by the Graduate School and the College of Business Administration, students will be classified as special provisional graduate students so that they may take graduate courses while completing the bachelor of science degree requirements. Students' special status must be tracked by the M.B.A. office to assure AACSB compliance. Also, the B.S.E.T. degree must be granted in a semester prior to graduating with the M.B.A.

To satisfy the requirements for the M.B.A., students must complete all of the core and elective required courses in the M.B.A. program. By choosing the right courses, this may be accomplished with six undergraduate-level and 11 graduate-level business courses.

For B.S.E.T. degree students, the degree program normally requires four years, and the M.B.A. program would require an additional two years. It is anticipated that by enrolling in the two programs simultaneously, a total of five and one half years will be required for completion of both degrees.

Guaranteed Admission Program to the University of Toledo College of Law

Students who graduate with a bachelor of science degree from the College of Engineering with a minimum GPA of 3.4, have an LSAT score at or above the 50th percentile, and who have not committed an act or acts involving moral turpitude (e.g., a felony, an academic suspension) will be guaranteed admission to The University of Toledo College of Law upon submission of a completed application.

Admission Requirements

Entering Freshmen

To be considered for admission to one of the bachelor of science in engineering technology programs, new direct-from-high-school students need a minimum cumulative high school GPA of 2.0 **and** a minimum ACT composite score of 21 (or SAT combined score of 980). Students who do not meet the minimum requirements will be considered for admission to the Student Success Center or may choose another University program.

Transfer Students (Admission with Advanced Standing)

Students transferring into the College of Engineering from within the University or from other colleges and universities must have a minimum cumulative GPA of 2.0. Transfer to upper level engineering technology programs requires a cumulative GPA of 2.0.

Students transferring from other institutions must earn at least 32 hours of undergraduate credit in residence at The University of Toledo. At least 14 of these hours must be in the major area. The remainder of the hours is to be in engineering science, engineering design and other areas as necessary to meet degree requirements.

Full-time students must take their last semester in residence (part-time students must take their last 14 hours in residence), unless exceptional arrangements have been made in advance with the associate dean of undergraduate studies in the college. Bachelor of science in engineering technology students must earn at least 32 hours at The University of Toledo, not including deficiencies. Associate of applied science students must earn at least 17 hours at The University of Toledo – at least 8 hours must be in the major.

Cooperative (Co-op) Education Program

For engineering technology students, participation in the co-op program is optional. Students who wish to participate in this program should contact the Career Management Center in the College of Engineering at 419.530.8050.

Professional Registration

B.S.E.T. Degree Students

Registration by the state of Ohio as a Professional Engineer is important for professional practice and requires eight years of experience as an engineering technologist after graduation. However, the first step is applying for and passing the Fundamentals of Engineering (FE) Examination, formerly known as the Engineer-in-Training (EIT) exam. The exam is generally given in April and October of each year. Application deadlines, however, are several months earlier. All engineering technology graduates are encouraged to take the FE near their date of graduation and are permitted to sit for the exam up to six months prior to graduation with a letter from the dean. After the necessary period of acceptable engineering experience, the State Board of Registration will permit the graduate to take the Professional Engineers (PE) examination. Engineering technology graduates must pass the FE exam and need a minimum of eight years of engineering experience before taking the PE exam.

For students graduating in the spring or summer, the FE Examination is given in Cincinnati, Columbus and Cleveland on a Saturday in April. For fall graduates, the FE exam is given in Cincinnati, Columbus and Cleveland on a Saturday in October. Applications should be filed with the board in Columbus at least 90 days prior to the examination date. Further information is available in the Office of the Associate Dean of Undergraduate Studies, or from the Secretary of the Board of Registration for Professional Engineers and Surveyors, 77 S. High St., Columbus, OH 43266-0314, *www.ohiopeps.org,* or from the National Council of Examiners for Engineering and Surveying Web site at *www.ncees.org*.

Department of Engineering Technology

Daniel J. Solarek, chair

Graduates of the B.S.E.T. program are eligible to sit for the FE examination in most states as the first step toward registration as a Professional Engineer (PE). Students transferring into this program from other colleges and universities with deficiencies will be required to complete course prerequisites before enrolling in required upper-division courses.

Computer Science and Engineering Technology

Computer science and engineering technology prepares students for positions as engineering technologists in engineering support in the electronics industry, manufacturing, testing, sales and service, and design support of equipment and systems used in communication, instrumentation, computers, automation and power.

The educational objectives of the computer science and engineering technology program are to:

- Provide students with the skills necessary to pursue a professional career;
- Provide students with skill in the use of analytical and laboratory tools associated with computer science and engineering technology; and
- Provide students with an understanding of some of the social contexts in which their technical contributions will be applied.

Graduates of the computer science and engineering technology program are expected to have:

a. An appropriate mastery of the knowledge, techniques, skills and modern tools associated with computer science and engineering technology;
b. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology;
c. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes concerning computer science and engineering technology;
d. An ability to use creativity in the design and use of computer systems and processes;
e. An ability to function as part of a team;
f. An ability to identify, analyze and solve technical problems associated with computer science and engineering technology;
g. An ability to communicate effectively;
h. An understanding of the need for and the ability to engage in lifelong learning;
i. Recognition of professional, ethical and social responsibilities;
j. A respect for diversity and knowledge of contemporary professional, societal and global issues; and
k. A commitment to quality, timeliness and continuous improvement.

Construction Engineering Technology

Construction engineering technology prepares students for positions as engineering technicians or technologists in engineering support in the construction industry, shelter and transportation infrastructure.

It is the mission of the construction engineering technology (C.E.T.) program to prepare students to obtain career positions as professionals in the construction and building industries where they will ensure quality in all phases of construction projects including

- Coordination of the design process;
- Monitoring of the quality control of materials and workmanship; and
- Management of costs and progression of construction.

In order to achieve this mission, the goals of the program are to:

- Provide students with a core of basic engineering theory and practice through realistic training and education that emphasizes the practices used in the construction industry;
- Educate students about the manner in which the earth's natural resources are used as components in the construction industry;
- Educate students to gain knowledge of construction requirements and management skills in order to have the ability to assist in the supervision and management of projects in the industry; and
- Fulfill the changing needs of local business and industry for qualified employees in the areas of construction technical sales, materials testing, surveying, construction contracting and building and infra-structure design.

In addition to the above program specific outcomes, the C.E.T. program embraces the 11 (a) through (k) ABET outcomes as part of the C.E.T. program requirements. In addition to the above, graduates of the construction engineering technology program are expected to have:

a. An appropriate mastery of the knowledge, techniques, skills and modern tools associated with construction engineering technology;
b. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology;
c. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes concerning construction engineering technology;
d. An ability to use creativity in the design and use of building systems and construction processes;
e. An ability to function as part of a team;
f. An ability to identify, analyze and solve technical problems associated with construction engineering technology;
g. An ability to communicate effectively;
h. An understanding of the need for, and an ability to engage in lifelong learning;
i. Recognition of professional, ethical and social responsibilities;
j. A respect for diversity and knowledge of contemporary professional, societal and global issues; and
k. A commitment to quality, timeliness and continuous improvement.

Electrical Engineering Technology

Electrical engineering technology prepares students for positions as engineering technicians or technologists in engineering support in the electronics industry, manufacturing, testing, sales and service, and design support of equipment and systems used in communication, instrumentation, computers, automation and power.

The educational objectives of the electrical engineering technology program are to:

- Provide students with the skills necessary to successfully pursue a professional career;
- Provide students with skill in the use of analytical and laboratory tools associated with electrical engineering technology; and
- Provide students with an understanding of some of the social contexts within which their technical contributions will be applied.

Graduates of the electrical engineering technology program are expected to have:

a. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines;
b. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology;
c. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes;

d. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives;
e. An ability to function effectively on teams;
f. An ability to identify, analyze and solve technical problems;
g. An ability to communicate effectively;
h. A recognition of the need for, and an ability to engage in lifelong learning;
i. An ability to understand professional, ethical and social responsibilities;
j. A respect for diversity and a knowledge of contemporary professional, societal and global issues; and
k. A commitment to quality, timeliness, and continuous improvement.

Mechanical Engineering Technology

Mechanical engineering technology prepares students for positions as engineering technicians and technologists and as applications engineers in areas such as manufacturing, maintenance, testing, inspection, quality control, systems design and plant operations.

The educational objectives of the mechanical engineering technology program are to:

- Equip students to understand the professional and ethical responsibilities of a mechanical engineer and the importance of lifelong learning, quality and continuous improvement;
- Develop teamwork skills;
- Develop skills for effective communication; and
- Prepare students to identify, analyze, formulate and solve technical problems relating to mechanical engineering

Graduates of the mechanical engineering technology program are expected to have:

a. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines;
b. An ability to apply current knowledge and adapt to emerging applications of mathematics, science and technology;
c. An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes;
d. An ability to use creativity in the design and use of systems, components or processes appropriate to program objectives;
e. An ability to function effectively on teams;
f. An ability to identify, analyze and solve technical problems;
g. An ability to communicate effectively;
h. A recognition of the need for, and an ability to engage in lifelong learning;
i. An ability to understand professional, ethical and social responsibilities;
j. A respect for diversity and a knowledge of contemporary professional, societal and global issues;
k. A commitment to quality, timeliness, and continuous improvement.

The following, as well as other upper-division courses in the College of Engineering that are closely related to the discipline, are approved as technical electives:

CET	2980	Engineering Economics	3
EEES	3250	Engineering Geology	3
EET	3150	Unix, C, & the Internet	4
ENGT	4900	Review for Professional Certification	3
MET	4600	Engineering Safety	3

Degree Requirements
Students should follow and complete the degree requirements in the Computer Science and Engineering Technology Full-time, Part-time, or Co-op charts.

Computer Science and Engineering Technology (Full-time)

	Fall Semester		Spring Semester	
Freshman Year	MATH 1330 Trigonometry ENGT 1000 Intro. To Engineering Tech. Hum./Soc. Sci./Multicultural Elective ENGL 1110 College Composition I CSET 1100 Intro to CSET EET 2420 Elect. Instrumentation Lab **Total 14 hours**	3 cr. 1 cr. 3 cr. 3 cr. 3 cr. 1 cr.	CSET 1200 GUI Programming ENGT 3050 Fundamentals of Electricity PHYS 2010 Tech. Physics Mechanics ENGL 2950 Sci. & Tech. Report Writing Hum,/ Soc. Sci./Multicultural Elective **Total 17 hours**	3 cr. 4 cr. 4 cr. 3 cr. 3 cr.
Sophomore Year	MATH 2450 Technical Calculus I PHYS 2020 Tech. Physics CSET 2100 Small Computers Systems EET 2230 Assembly Language Prog. **Total 16 hours**	4 cr. 4 cr. 4 cr. 4 cr.	EET 2210 Digital Logic Fundamentals MATH 2460 Technical Calculus II CSET 2200 PC & Industrial Networks EET 2410 Programmable Controllers Hum./Soc. Sci./Multicultural Elective **Total 19 hours**	4 cr. 4 cr. 4 cr. 4 cr. 3 cr.
Junior Year	ENGT 3010 Applied Statistics & DOE MATH 2890 Num. Methods & Linear Alg. EET 3150 UNIX, C & the Internet CSET Elective Hum./Soc. Sci./Multicultural Elective **Total 17 hours**	4 cr. 3 cr. 4 cr. 3 cr. 3 cr.	CSET 4750 Comp. Net. & Data Comm EET 3350 Digital Systems Design CSET 3200 Client/Server Computing CSET 3300 Database Driven Web Sites **Total 15 hours**	4 cr. 4 cr. 3 cr. 4 cr.
Senior Year	EET 4250 Microcomputer Architecture CSET 4100 CGI Prog With Perl & Java Communication Elective Professional Development Elective **Total 14 hours**	4 cr. 3 cr. 3 cr. 4 cr.	ENGT 4050 Senior Tech. Capstone CSET Elective CSET 4250 Applied Prog. Languages Professional Development Elective Hum./Soc. Sci./Multicultural Elective **Total 16 hours**	3 cr. 4 cr. 3 cr. 3 cr. 3 cr.

Computer Science and Engineering Technology (Part-time)

	Fall Semester		Spring Semester		Summer Semester	
Year 1	MATH 1330 Trigonometry ENGT 1000 Intro. To Engineering Tech. Hum./Soc. Sci./Multicultural Elective EET 2420 Elect. Instrumentation Lab **Total 8 hours**	3 cr. 1 cr. 3 cr. 1 cr.	CSET 1100 Intro to CSET ENGL 1110 College Composition I **Total 6 hours**	3 cr. 3 cr.	CSET 1200 GUI Programming Hum./Soc. Sci./Multicultural Elective **Total 6 hours**	3 cr. 3 cr.
Year 2	MATH 2450 Technical Calculus I EET 2210 Digital Logic Fundamentals **Total 8 hours**	4 cr. 4 cr.	MATH 2460 Technical Calculus II ENGL 2950 Sci. & Tech. Report Writing **Total 7 hours**	4 cr. 3 cr.	CSET 2100 Small Computers Systems EET 2230 Assembly Language Prog. **Total 8 hours**	4 cr. 4 cr.
Year 3	EET 2410 Prog. Controller Fund. PHYS 2010 Technical Physics II **Total 8 hours**	4 cr. 4 cr.	Hum./Soc. Sci./Multicultural PHYS 2020 Technical Physics II **Total 7 hours**	3 cr. 4 cr.	CSET 2200 PC & Industrial Networks ENGT 3050 Fund. Of Electricity **Total 8 hours**	4 cr. 4 cr.
Year 4	MATH 2890 Num. Methods & Linear Alg. CSET Elective **Total 7 hours**	3 cr. 4 cr.	EET 3150 UNIX, C & the Internet Hum./Soc. Sci./Multicultural Elective **Total 7 hours**	4 cr. 3 cr.	EET 3350 Digital Systems Design CSET 4750 Comp. Net. & Data Comm. **Total 8 hours**	4 cr. 4 cr.
Year 5	CSET 3200 Client-Server Computing CSET 3300 Dbase Driven Websites **Total 7 hours**	3 cr. 4 cr.	EET 4250 Microcomputer Arch. CSET 4100 CGI Prog. With Perl & Java **Total 7 hours**	4 cr. 3 cr.	ENGT 3010 Appl. Statistics & DOE CSET Elective **Total 7 hours**	4 cr. 3 cr.
Year 6	CSET 4250 Applied Prog. Languages Professional Development Elective **Total 6 hours**	3 cr. 3 cr.	Hum./Soc. Sci./Multicultural Elective ENGT 4050 Senior Tech. Capstone **Total 6 hours**	3 cr. 3 cr.	Professional Development Elective Communication Elective **Total 7 hours**	4 cr. 3 cr.

Computer Science and Engineering Technology (Co-op Plan A)

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. Social Science Elective 3 cr. ENGL 1110 College Composition I 3 cr. CSET 1100 Intro to CSET 3 cr. EET 2420 Elect. Instrumentation Lab 1 cr. **Total 14 hours**	CSET 1200 GUI Programming 3 cr. PHYS 2010 Tech. Physics I 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. EET 2210 Digital Logic Fundamentals 4 cr. ENGT 2000 Professional Development 1 cr. **Total 15 hours**	OPEN
Sophomore Year	PHYS 2020 Tech. Physics II 4 cr. MATH 2450 Technical Calculus I 4 cr. CSET 2100 Small Computers Systems 4 cr. EET 2230 Assembly Language Prog. 4 cr. **Total 16 hours**	EET 2410 Prog. Fund Controllers 4 cr. MATH 2460 Technical Calculus II 4 cr. CSET 2200 PC & Industrial Networks 4 cr. Humanities Elective 3 cr **Total 15 hours**	ENGT 3010 Applied Statistics & DOE 4 cr. ENGT 3050 Fund. Of Electricity 4 cr. CSET 4750 Comp. Net. & Data Comm 4 cr. Multicultural Elective (U.S.) 3 cr. **Total 15 hours**
Pre-Junior Year	ENGT 3940 Co-op #1	MATH 2890 Num. Methods & Linear Alg. 3 cr. EET 3150 UNIX, C & the Internet 4 cr. CSET 3200 Client/Server Computing 3 cr. Hum/Multicultural Elective (U.S.) 3 cr. **Total 13 hours**	ENGT 3940 Co-op #2
Junior Year	CSET 4100 Server Side Programming 3 cr. CSET Elective 4 cr. Professional Development Elective 3 cr. Communication Elective 3 cr. **Total 13 hours**	ENGT 3940 Co-op #3	CSET 3300 Dbase Driven Websites 4 cr. EET 3350 Digital Systems Design 4 cr. CSET Elective 3 cr. Professional Development Elective 3 cr. **Total 14 hours**
Senior Year	ENGT 3940 Co-op #4 (Optional)	ENGT 4050 Senior Tech. Capstone 3 cr. EET 4250 Microcomputer Architecture 4 cr. CSET 4250 Applied Prog. Languages 3 cr. Social Science Elective 3 cr. **Total 13 hours**	

Computer Science and Engineering Technology (Co-op Plan B)

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. Social Science Elective 3 cr. ENGL 1110 College Composition I 3 cr. CSET 1100 Intro to CSET 3 cr. EET 2420 Elect. Instrumentation Lab 1 cr. **Total 14 hours**	CSET 1200 GUI Programming 3 cr. PHYS 2010 Tech. Physics I 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. EET 2210 Digital Logic Fundamentals 4 cr. ENGT 2000 Professional Development 1 cr. **Total 15 hours**	OPEN
Sophomore Year	PHYS 2020 Tech. Physics II 4 cr. MATH 2450 Technical Calculus I 4 cr. CSET 2100 Small Computers Systems 4 cr. EET 2230 Assembly Language Prog. 4 cr. **Total 16 hours**	EET 2410 Prog. Fund Controllers 4 cr. MATH 2460 Technical Calculus II 4 cr. CSET 2200 PC & Industrial Networks 4 cr. Humanities Elective 3 cr **Total 15 hours**	ENGT 3010 Applied Statistics & DOE 4 cr. ENGT 3050 Fund. Of Electricity 4 cr. CSET 4750 Comp. Net. & Data Comm 4 cr. Multicultural Elective (U.S.) 3 cr. **Total 15 hours**
Pre-Junior Year	MATH 2890 Num. Methods & Linear Alg. 3 cr. EET 3150 UNIX, C & the Internet 4 cr. CSET 3200 Client/Server Computing 3 cr. Hum/Multicultural Elective (U.S.) 3 cr. **Total 13 hours**	ENGT 3940 Co-op #1	CSET 3300 Dbase Driven Websites 4 cr. EET 3350 Digital Systems Design 4 cr. CSET Elective 3 cr. Professional Development Elective 3 cr. **Total 14 hours**
Junior Year	ENGT 3940 Co-op #2	CSET 4100 Server Side Programming 3 cr. CSET Elective 4 cr. Professional Development Elective 3 cr. Communication Elective 3 cr. **Total 13 hours**	ENGT 3940 Co-op #3
Senior Year	ENGT 4050 Senior Tech. Capstone 3 cr. EET 4250 Microcomputer Architecture 4 cr. CSET 4250 Applied Prog. Languages 3 cr. Social Science Elective 3 cr. **Total 13 hours**	ENGT 3940 Co-op #4 (Optional)	

Degree Requirements
Students should follow and complete the degree requirements in the Construction Engineering Technology Full-time, Part-time, or Co-op charts.

Construction Engineering Technology (Full-time)

	Fall Semester		Spring Semester	
Freshman Year	MATH 1330 Trigonometry	3 cr.	ENGL 1110 College Composition I	3 cr.
	ENGT 1000 Intro. To Engineering Tech.	1 cr.	PHYS 2010 Technical Physics: Mechanics	4 cr.
	ENGT 1050 Computers for Eng. Tech.	3 cr.	CET 1210 Surveying	3 cr.
	CET 1100 Architectural Graphics	3 cr.	ARCT 2250 Building Systems	3 cr.
	CET 1150 Construction Matls & Codes	3 cr.	MC/Hum/SS Elective	3 cr.
	CET 1000 Intro. To Constr. Engr. Tech.	1 cr		
	Total 14 hours		**Total 16 hours**	
Sophomore Year	PHYS 2020 Technical Physics	4 cr.	CET 2220 Soil Mechanics	3 cr.
	MATH 2450 Technical Calculus I	4 cr.	ARCT 1260 Construction Estimating	3 cr.
	CET 1200 Engineering Mechanics	4 cr.	CET 2250 Structural Design	4 cr.
	CET 2110 Materials Testing	3 cr.	CET 2030 Construction Graphics	3 cr.
	ENGL 2950 Sci. & Tech. Report Writing	3 cr.	MC/Hum/SS Elective	3 cr.
	Total 18 hours		**Total 16 hours**	
Junior Year	CET 3210 Surveying Applications	3 cr.	CET 3220 Hydrology and Hydraulics	3 cr.
	MATH 2460 Technical Calculus II	4 cr.	CET 3120 Adv. Construction Materials	3 cr.
	Professional Development Elective	3 cr.	ENGT 3010 Applied Stats & Des of Exp.	4 cr.
	Communication Elective	3 cr.	ARCT 2160 Contracts and Specifications	3 cr.
	Natural Science Elective	3 cr.	Professional Development Elective	3 cr.
	Total 16 hours		**Total 16 hours**	
Senior Year	CET 4250 Advanced Structural Design	4 cr.	ENGT 4050 Senior Tech. Capstone	3 cr.
	CET 4460 Construction Mgmt & Sched.	3 cr.	CET 4350 Soils, Foundation, & Earth Structures	4 cr.
	CET 2980 Engineering Economics	3 cr.	MC/Hum/SS Elective	3 cr.
	Professional Development Elective	3 cr.	MC/Hum/SS Elective	3 cr.
	MC/Hum/SS Elective	3 cr.	Professional Development Elective	3 cr.
	Total 16 hours		**Total 16 hours**	

Construction Engineering Technology (Part-time)

	Fall Semester		Spring Semester		Summer Semester	
Year 1	CET 1000 Intro to Constr. Eng. Tech.	1 cr.	CET 1100 Architectural Graphics	3 cr.	ENGL 1110 College Composition I	3 cr.
	ENGT 1000 Intro. To Engineering Tech.	1 cr.	CET 1150 Construction Matls & Codes	3 cr.	MATH 1330 Trigonometry	3 cr.
	ENGT 1050 Computers for Eng. Tech.	3 cr.				
	Total 5 hours		**Total 6 hours**		**Total 6 hours**	
Year 2	ENGL 2950 Sci. & Tech. Report Writing	3 cr.	PHYS 2020 Technical Physics	4 cr.	CET 1200 Engineering Mechanics	4 cr.
	PHYS 2010 Technical Physics: Mechanics	4 cr.	ARCT 2250 Building Systems	3 cr.	CET 1210 Surveying	3 cr.
	Total 7 hours		**Total 7 hours**		**Total 7 hours**	
Year 3	CET 2250 Structural Design	4 cr.	ARCT 1260 Construction Estimating	3 cr.	Professional Development Elective	3 cr.
	CET 2110 Materials Testing	3 cr.	MATH 2450 Technical Calculus I	4 cr.	Hum/SS/Multicultural Elective	3 cr.
	CET 2030 Construction Graphics	3 cr.			**Total 6 hours**	
	Total 10 hours		**Total 7 hours**			
Year 4	Natural Science Elective	3 cr.	CET 2220 Soil Mechanics	3 cr.	Professional Development Elective	3 cr.
	CET 3210 Surveying Applications	3 cr.	ARCT 2160 Contracts & Specifications	3 cr.	Hum/SS/Multicultural Elective	3 cr.
			CET-3220 Hydrology & Hydraulics	3 cr.		
	Total 6 hours		**Total 9 hours**		**Total 6 hours**	
Year 5	CET 2980 Engineering Economics	3 cr.	CET 3120 Adv. Construction Materials	3 cr.	Professional Development Elective	3 cr.
	ENGT-3010 App. Stats & Des. Exmnts.	4 cr.	MATH 2460 Technical Calculus II	4 cr.	Communications Elective	3 cr.
	CET 4250 Adv. Structural Design	4 cr.				
	Total 11 hours		**Total 7 hours**		**Total 6 hours**	
Year 6	CET 4460 Construction Mgmt & Sched.	3 cr.	CET 4350 Soils, Foundation, & Earth Structures	4 cr.	Professional Development Elective	3 cr.
	Hum/SS/Multicultural Elective	3 cr.	ENGT 4050 Senior Tech. Capstone	3 cr.	Hum./Soc. Sci./Multicultural Electives	3 cr.
	Hum/SS/Multicultural Elective	3 cr				
	Total 9 hours		**Total 7 hours**		**Total 6 hours**	

Construction Engineering Technology (Co-op) Plan A

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. CET 1100 Architectural Graphics 3 cr. CET 1150 Construction Matls & Codes 3 cr. CET 1000 Intro. To Constr. Engr. Tech. 1 cr **Total 14 hours**	ENGL 1110 College Composition I 3 cr. PHYS 2010 Technical Physics: Mechanics 4 cr. CET 1210 Surveying 3 cr. ARCT 2250 Building Systems 3 cr. MC/Hum/SS Elective 3 cr. ENGT 2000 Professional Development 1 cr. **Total 17 hours**	Open
Sophomore Year	PHYS 2020 Technical Physics 4 cr. MATH 2450 Technical Calculus I 4 cr. CET 1200 Engineering Mechanics 4 cr. CET 2110 Materials Testing 3 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. **Total 18 hours**	CET 2220 Soil Mechanics 3 cr. ARCT 1260 Construction Estimating 3 cr. CET 2250 Structural Design 4 cr. CET 2030 Construction Graphics 3 cr. MC/Hum/SS Elective 3 cr. **Total 16 hours**	ENGT 3940 Co-op #1
Pre-Junior Year	MATH 2460 Technical Calculus II 4 cr. CET 3210 Survey Applications 3 cr. Professional Development Elective 3 cr. Natural Science Elective 3 cr. Communications Elective 3 cr. **Total 16 hours**	ENGT 3940 Co-op #2	Professional Development Elective 3 cr. ENGT 3010 App. Stats & Des. Expmnts. 4 cr. Professional Development Elective 3 cr. MC/Hum/SS Elective 3 cr. Professional Development Elective 2 cr. **Total 15 hours**
Junior Year	ENGT 3940 Co-op #3	CET 3120 Adv. Construction Materials 3 cr. CET 4350 Soils, Found. & Earth Struct. 4 cr. CET 3220 Hydrology & Hydraulics 3 cr. ARCT 2160 Contracts & Specifications 3 cr. MC/Hum/SS Elective 3 cr. **Total 16 hours**	ENGT 3940 Co-op #4
Senior Year	CET 2980 Engineering Economy 3 cr. ENGT 4050 Senior Tech. Capstone 3 cr. CET 4250 Adv. Structural Design 4 cr. CET 4460 Const. Mgmt & Scheduling 3 cr. MC/Hum/SS Elective 3 cr. **Total 16 hours**		

Construction Engineering Technology (Co-op) Plan B

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. CET 1100 Architectural Graphics 3 cr. CET 1150 Construction Matls & Codes 3 cr. CET 1000 Intro. To Constr. Engr. Tech. 1 cr **Total 14 hours**	ENGL 1110 College Composition I 3 cr. PHYS 2010 Technical Physics: Mechanics 4 cr. CET 1210 Surveying 3 cr. ARCT 2250 Building Systems 3 cr. MC/Hum/SS Elective 3 cr. ENGT 2000 Professional Development 1 cr. **Total 17 hours**	Open
Sophomore Year	PHYS 2020 Technical Physics 4 cr. MATH 2450 Technical Calculus I 4 cr. CET 1200 Engineering Mechanics 4 cr. CET 2110 Materials Testing 3 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. **Total 18 hours**	CET 2220 Soil Mechanics 3 cr. ARCT 1260 Construction Estimating 3 cr. CET 2250 Structural Design 4 cr. CET 2030 Construction Graphics 3 cr. MC/Hum/SS Elective 3 cr. **Total 16 hours**	Open
Pre-Junior Year	ENGT 3940 Co-op #1	CET 3120 Adv. Construction Materials 3 cr. CET 4350 Soils, Found. & Earth Struct. 4 cr. CET 3220 Hydrology & Hydraulics 3 cr. ARCT 2160 Contracts & Specifications 3 cr. MC/Hum/SS Elective 3 cr. **Total 16 hours**	ENGT 3940 Co-op #2
Junior Year	MATH 2460 Technical Calculus II 4 cr. CET 3210 Survey Applications 3 cr. Professional Development Elective 2 cr. Natural Science Elective 3 cr. CET 4250 Adv. Structural Design 4 cr. **Total 16 hours**	ENGT 3940 Co-op #3	Professional Development Elective 3 cr. ENGT 3010 App. Stats. & Des. Expmnts. 4 cr. Professional Development Elective 3 cr. MC/Hum/SS Elective 3 cr. Professional Development Elective 3 cr. **Total 16 hours**
Senior Year	CET 2980 Engineering Economy 3 cr. ENGT 4050 Senior Tech. Capstone 3 cr. Communications Elective 3 cr. CET 4460 Const. Mgmt & Scheduling 3 cr. MC/Hum/SS Elective 3 cr. **Total 15 hours**		

Degree Requirements
Students should follow and complete the degree requirements in the Electrical Engineering Technology Full-time, Part-time, or Co-op charts.

Electrical Engineering Technology (Full-time)

	Fall Semester	Spring Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGL 1110 College Composition I 3 cr. EET 1010 Resistive Circuits 4 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. **Total 14 hours**	EET 1410 Electrical Drafting 3 cr. EET 1020 Reactive Circuits 4 cr. EET 2210 Digital Logic Fundamentals 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. Social Science Elective 3 cr. **Total 17 hours**
Sophomore Year	PHYS 2010 Technical Physics: Mechanics 4 cr. MATH 2450 Technical Calculus I 4 cr. EET 2010 Electronic Principles 4 cr. EET 2230 Assembly Language Prog. 4 cr. **Total 16 hours**	MATH 2460 Technical Calculus II 4 cr. PHYS 2020 Technical Physics 4 cr. EET 2020 Electronic Device Applications 4 cr. EET 2410 Programmable Controller Fund. 4 cr. **Total 16 hours**
Junior Year	ENGT 3010 Applied Statistics and Design of Experiments 4 cr. ENGT 3020 Applied Engineering Math 3 cr. EET 3150 UNIX, C, and Internet 4 cr. Communication Elective 3 cr. Multicultural Elective 3 cr. **Total 17 hours**	EET 3250 Network Analysis 4 cr. EET 3350 Digital Systems Design 4 cr. Professional Development Elective 4 cr. EET 4550 Programmable Controller Applications 4 cr. **Total 16 hours**
Senior Year	EET 4150 Analog Systems Design 4 cr. EET 4250 Microcomputer Architecture 4 cr. EET 4350 Electric Power Systems 4 cr. Multicultural & Humanities Elective 3 cr. **Total 15 hours**	ENGT 4050 Senior Tech. Capstone 3 cr. EET 4450 Automatic Control Systems 4 cr. Professional Development Elective 4 cr. Social Science Elective 3 cr. Humanities Elective 3 cr. **Total 17 hours**

Electrical Engineering Technology (Part-time)

	Fall Semester	Spring Semester	Summer Semester
Year 1	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. **Total 7 hours**	EET 1410 Electrical Drafting 3 cr. EET 1010 Resistive Circuits 4 cr. **Total 7 hours**	ENGL 1110 College Composition I 3 cr. EET 1020 Reactive Circuits 4 cr. **Total 7 hours**
Year 2	MATH 2450 Technical Calculus I 4 cr. EET 2210 Digital Logic Fundamentals 4 cr. **Total 8 hours**	MATH 2460 Technical Calculus II 4 cr. EET 2010 Electronic Principles 4 cr. **Total 8 hours**	EET 2020 Electronic Device Applications 4 cr. EET 2230 Assembly Language 4 cr. **Total 8 hours**
Year 3	PHYS 2010 Tech. Physics I 4 cr. EET 2410 Programmable Controller Fund. 4 cr. **Total 8 hours**	PHYS 2020 Technical Physics II 4 cr. Social Science Elective 3 cr. **Total 7 hours**	ENGL 2950 Report Writing. 3 cr. EET 4550 Prog. Controller Appl. 4 cr. **Total 7 hours**
Year 4	ENGT 3020 Applied Eng. Mathematics 3 cr. Communications Elective 3 cr. **Total 6 hours**	EET 3150 UNIX, C & the Internet 4 cr. Social Science Elective 3 cr. **Total 7 hours**	EET 3350 Digital Design 4 cr. EET 3250 Network Analysis 4 cr. **Total 8 hours**
Year 5	Multicultural Elective 3 cr. Professional Development Elective 4 cr. **Total 7 hours**	EET 4150 Analog Systems Design 4 cr. EET 4350 Electric Power Systems 4 cr. **Total 8 hours**	ENGT 3010 Statistics & DOE 4 cr. Humanities Elective 3 cr. **Total 7 hours**
Year 6	EET 4450 Automatic Control Systems 4 cr. Humanities/Multicultural Elective 3 cr. **Total 7 hours**	EET 4250 Microcomputer Architecture 4 cr. ENGT 4050 Senior Tech. Capstone 3 cr. **Total 7 hours**	Professional Development Elective 4 cr. **Total 4 hours**

Electrical Engineering Technology (Co-op Plan A)

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. to Engineering Tech. 1 cr. ENGL 1110 College Composition I 3 cr. EET 1010 Resistive Circuits 4 cr. ENGT 1050 Computers for Eng Tech 3 cr. **Total 14 hours**	EET 1410 Electrical Drafting 3 cr. EET 1020 Reactive Circuits 4 cr. EET 2210 Digital Logic 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. ENGT 2000 Prof. Development 1 cr. **Total 15 hours**	OPEN
Sophomore Year	PHYS 2010 Tech. Physics: Mechanics 4 cr. MATH 2450 Technical Calculus I 4 cr. EET 2230 Assembly Language 4 cr. EET 2010 Electronic Priniciples 4 cr. **Total 16 hours**	MATH 2460 Technical Calculus II 4 cr. PHYS 2020 Technical Physics II 4 cr. EET 2020 Electronic Device Appl. 4 cr. EET 2410 Programm. Controller Fund. 4 cr. . **Total 16 hours**	ENGT 3010 Statistics & DOE 4 cr. EET 4550 PLC Applications 4 cr. Professional Development Elective 3 cr. Humanities Elective 3 cr. **Total 14 hours**
Pre-Junior Year	ENGT 3940 Co-op #1	ENGT 3020 Applied Eng. Math 3 cr. EET 4150 Analog System Design 4 cr. Social Science Elective 3 cr. Multicultural Elective 3 cr. **Total 13 hours**	ENGT 3940 Co-op #2
Junior Year	EET 3150 UNIX, C & the Internet 4 cr. EET 4350 Electric Power Systems 4 cr. Social Science Elective 3 cr. Multicultural & Humanities Elective 3 cr. **Total 14 hours**	ENGT 3940 Co-op #3	EET 3350 Digital Systems Design 4 cr. EET 3250 Network Analysis 4 cr. Professional Development Elective 4 cr. **Total 12 hours**
Senior Year	ENGT 3940 Co-op #4 (optional)	ENGT 4050 Senior Tech. Capstone 3 cr. EET 4450 Automatic Control Systems 4 cr. EET 4250 Microcomputer Architecture 4 cr. Communications Elective 3 cr. **Total 14 hours**	

Electrical Engineering Technology (Co-op Plan B)

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. to Engineering Tech. 1 cr. ENGL 1110 College Composition I 3 cr. EET 1010 Resistive Circuits 4 cr. ENGT 1050 Computers for Eng Tech 3 cr. **Total 14 hours**	EET 1410 Electrical Drafting 3 cr. EET 1020 Reactive Circuits 4 cr. EET 2210 Digital Logic 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. ENGT 2000 Prof. Development 1 cr. **Total 15 hours**	OPEN
Sophomore Year	PHYS 2010 Tech. Physics: Mechanics 4 cr. MATH 2450 Technical Calculus I 4 cr. EET 2230 Assembly Language 4 cr. EET 2010 Electronic Priniciples 4 cr. **Total 16 hours**	MATH 2460 Technical Calculus II 4 cr. PHYS 2020 Technical Physics II 4 cr. EET 2020 Electronic Device Appl. 4 cr. EET 2410 Programm. Controller Fund. 4 cr. . **Total 16 hours**	ENGT 3010 Statistics & DOE 4 cr. EET 4550 PLC Applications 4 cr. Professional Development Elective 3 cr. Humanities Elective 3 cr. **Total 14 hours**
Pre-Junior Year	ENGT 3020 Applied Eng. Math 3 cr. EET 4150 Analog System Design 4 cr. Social Science Elective 3 cr. Multicultural Elective 3 cr. **Total 13 hours**	ENGT 3940 Co-op #1	EET 3150 UNIX, C & the Internet 4 cr. EET 3250 Network Analysis 4 cr. Professional Development Elective 4 cr. **Total 12 hours**
Junior Year	ENGT 3940 Co-op #2	EET 3350 Digital Systems Design 4 cr. EET 4350 Electric Power Systems 4 cr. Social Science Elective 3 cr. Multicultural & Humanities Elective 3 cr. **Total 14 hours**	ENGT 3940 Co-op #3
Senior Year	ENGT 4050 Senior Tech. Capstone 3 cr. EET 4450 Automatic Control Systems 4 cr. EET 4250 Microcomputer Architecture 4 cr. Communications Elective 3 cr. **Total 14 hours**	ENGT 3940 Co-op #4 (optional)	

Degree Requirements
Students should follow and complete the degree requirements in the Mechanical Engineering Technology Full-time, Part-time or Co-op charts.

Mechanical Engineering Technology (Full-time)

	Fall Semester	Spring Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. MET 1020 Technical Drawing 3 cr. MET 1110 Metal Machining & Processes 3 cr. MET 1120 Metal Mach. & Proc. Lab 1 cr. **Total 14 hours**	ENGL 1110 College Composition I 3 cr. MET 1250 CADD 4 cr. PHYS 2010 Technical Physics: Mechanics 4 cr. Humanities Elective 3 cr. Social Science Elective 3 cr. **Total 17 hours**
Sophomore Year	PHYS 2020 Technical Physics 4 cr. MATH 2450 Technical Calculus I 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. MET 2100 Statics for Technology 3 cr. MET 2150 NC ***or*** MET 2350 Adv CADD 4 cr. **Total 18 hours**	MATH 2460 Technical Calculus II 4 cr. MET 2210 Technical Thermodynamics 4 cr. MET 2120 Strength of Materials for Tech 4 cr. MET 2050 Fluid & Hydraulic Mechanics 4 cr. **Total 16 hours**
Junior Year	ENGT 3010 Applied Statistics and Design of Experiments 4 cr. ENGT 3020 Applied Engineering Math 3 cr. MET 3400 Dynamics 3 cr. COMM 3810 Group Communication 3 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 General Chemistry I Lab 1 cr. **Total 18 hours**	MET 3100 Applied Thermodynamics 4 cr. MET 3200 Mechanical Design I 3 cr. ENGT 3040 Applied Materials Science 4 cr. Humanities Elective 3 cr. Professional Development Elective 1 cr. **Total 15 hours**
Senior Year	MET 4100 Applied Fluid Mechanics 4 cr. MET 4200 Mechanical Design II 3 cr. ENGT 3050 Fundamentals of Electricity 4 cr. Multicultural Elective (Diversity of US) 3 cr. Social Science Elective 3 cr. **Total 17 hours**	ENGT 4050 Senior Tech. Capstone 3 cr. EET 4450 Automatic Control Systems 4 cr. Technical Elective 3 cr. Multicultural Elective (Non-Western) 3 cr. Professional Development Elective 3 cr. **Total 16 hours**

Mechanical Engineering Technology (Part-time)

	Fall Semester	Spring Semester	Summer Semester
Year 1	ENGT 1000 Intro. To Engineering Tech. 1 cr. MET 1020 Technical Drawing 3 cr. MET 1110 Metal Machining & Processes 3 cr. MET 1120 Metal Mach. & Proc. Lab 1 cr. **Total 8 hours**	ENGT 1050 Computers for Eng. Tech 3 cr. MATH 1330 Trigonometry 3 cr. **Total 6 hours**	ENGL 1110 College Composition I 3 cr. PHYS 2010 Technical Physics: Mechanics 4 cr. **Total 7 hours**
Year 2	MATH 2450 Technical Calculus I 4 cr. MET 1250 CADD 4 cr. **Total 8 hours**	PHYS 2020 Technical Physics 4 cr. MET 2100 Statics for Technology 3 cr. **Total 7 hours**	MET 2120 Strength of Materials for Tech 4 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. **Total 7 hours**
Year 3	MET 2050 Fluid & Hydraulic Mechanics 4 cr. MET 2150 NC ***or*** MET 2350 Adv CADD 4 cr. **Total 8 hours**	MATH 2460 Technical Calculus II 4 cr. MET 2210 Technical Thermodynamics 4 cr. **Total 8 hours**	Social Services Elective 3 cr. Humanities Elective 3 cr. **Total 6 hours**
Year 4	ENGT 3020 Applied Eng. Mathematics 3 cr. MET 3200 Mechanical Design I 3 cr. **Total 6 hours**	MET 3100 Applied Thermodynamics 4 cr. MET 3400 Applied Dynamics 3 cr. **Total 7 hours**	ENGT 3010 Appl Stat & DOE 4 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 General Chemistry I Lab 1 cr. **Total 9 hours**
Year 5	ENGT 3040 Applied Materials Science 4 cr. ENGT 3050 Fundamentals of Electricity 4 cr. **Total 8 hours**	MET 4100 Applied Fluid Mechanics 4 cr. MET 4200 Mechanical Design II 3 cr. **Total 7 hours**	COMM 3810 Group Communication 3 cr. Humanities Elective 3 cr. **Total 6 hours**
Year 6	EET 4450 Automatic Control Systems 4 cr. Social Science Elective 3 cr. **Total 7 hours**	ENGT 4050 Senior Tech. Capstone 3 cr. Technical Elective (see advisor) 3 cr. Professional Development Elective 1 cr. **Total 7 hours**	Professional Development Elective 3 cr. Multicultural Elective (Diversity of US) 3 cr. Multicullltural Elective (Non-Western) 3 cr. **Total 9 hours**

Mechanical Engineering Technology (Co-op Plan A)

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. MET 1020 Technical Drawing 3 cr. MET 1110 Metal Mach. & Proc. 3 cr. MET 1120 Metal Mach. & Proc. Lab 1 cr. **Total 14 hours**	ENGL 1110 College Composition I 3 cr. PHYS 2010 Tech. Physics Mechanics 4 cr. MET 1250 CADD 4 cr. Humanities Elective 3 cr. ENGT 2000 Professional Development 1 cr. **Total 15 hours**	OPEN
Sophomore Year	PHYS 2020 Tech. Physics 4 cr. MATH 2450 Technical Calculus I 4 cr. MET 2100 Statics for Technology 3 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. Social Science Elective 3 cr. **Total 17 hours**	MATH 2460 Technical Calculus II 4 cr. MET 2050 Fluid & Hydraulic Mechanics 4 cr. MET 2120 Strength of Materials for Tech 4 cr. MET 2210 Tech Thermo 4 cr. COMM 3810 Sm Grp Communications 3 cr. **Total 19 hours**	OPEN
Pre-Junior Year	ENGT 3940 Co-op #1	MET 2150 NC ***or*** MET 2350 Adv CADD 4 cr. MET 3400 Dynamics 3 cr. ENGT 3010 Applied Statistics & DOE 4 cr. ENGT 3020 Applied Engineering Math 3 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 General Chemistry I Lab 1 cr. **Total 19 hours**	ENGT 3940 Co-op #2
Junior Year	ENGT 3040 Applied Mat'ls Science 4 cr. MET 3100 Applied Thermodynamics 4 cr. Technical Elective 3 cr. Social Science Elective 3 cr. Humanities Elective 3cr. **Total 17 hours**	ENGT 3940 Co-op #3	MET 3200 Mechanical Design I 3 cr. ENGT 3050 Fundamentals of Electricity 4 cr. MET 4100 Applied Fluid Mechanics 4 cr. Multicultural Elective (Diversity of US) 3 cr. **Total 14 hours**
Senior Year	ENGT 3940 Co-op #4 (optional)	MET 4200 Mechanical Design II 3 cr. ENGT 4050 Senior Tech. Capstone 3 cr. EET 4450 Automatic Control Systems 4 cr. Professional Development Elective 3 cr. Multicultural Elective (Non-Western) 3 cr. **Total 16 hours**	

Mechanical Engineering Technology (Co-op Plan B)

	Fall Semester	Spring Semester	Summer Semester
Freshman Year	MATH 1330 Trigonometry 3 cr. ENGT 1000 Intro. To Engineering Tech. 1 cr. ENGT 1050 Computers for Eng. Tech. 3 cr. MET 1020 Technical Drawing 3 cr. MET 1110 Metal Mach. & Proc. 3 cr. MET 1120 Metal Mach. & Proc. Lab 1 cr. **Total 14 hours**	ENGL 1110 College Composition I 3 cr. PHYS 2010 Tech. Physics Mechanics 4 cr. MET 1250 CADD 4 cr. Humanities Elective 3 cr. Social Science Elective 3 cr. **Total 17 hours**	OPEN
Sophomore Year	PHYS 2020 Tech. Physics 4 cr. MATH 2450 Technical Calculus I 4 cr. MET 2100 Statics for Technology 3 cr. ENGL 2950 Sci. & Tech. Report Writing 3 cr. ENGT 2000 Professional Development 1 cr. **Total 15 hours**	MET 2150 NC ***or*** MET 2350 Adv CADD 4 cr. MATH 2460 Technical Calculus II 4 cr. MET 2050 Fluid & Hydraulic Mechanics 4 cr. MET 2120 Strength of Materials for Tech 4 cr. MET 2210 Tech Thermo 4 cr. **Total 20 hours**	OPEN
Pre-Junior Year	MET 3400 Dynamics 3 cr. ENGT 3010 Applied Statistics & DOE 4 cr. ENGT 3020 Applied Engineering Math 3 cr. CHEM 1230 General Chemistry I 4 cr. CHEM 1280 General Chemistry I Lab 1 cr. COMM 3810 Sm Grp Communications 3 cr. **Total 18 hours**	ENGT 3940 Co-op #1	ENGT 3040 Applied Mat'ls Science 4 cr. MET 3100 Applied Thermodynamics 4 cr. Technical Elective 3 cr. Social Science Elective 3 cr. Humanities Elective 3 cr. **Total 17 hours**
Junior Year	ENGT 3940 Co-op #2	MET 3200 Mechanical Design I 3 cr. ENGT 3050 Fundamentals of Electricity 4 cr. MET 4100 Applied Fluid Mechanics 4 cr. Multicultural Elective (Diversity of US) 3 cr. **Total 14 hours**	ENGT 3940 Co-op #3
Senior Year	MET 4200 Mechanical Design II 3 cr. ENGT 4050 Senior Tech. Capstone 3 cr. EET 4450 Automatic Control Systems 4 cr. Professional Development Elective 3 cr. Multicultural Elective (Non-Western) 3 cr.	ENGT 3940 Co-op #4 (optional)	

College of Engineering Faculty

Department of Bioengineering

Brent D. Cameron, 2000, assistant professor
B.S.B.E., M.S.B.E., Ph.D., Texas A&M University

Ronald L. Fournier, 1985, professor
B.S.Ch.E., M.S.Ch.E., Ph.D., The University of Toledo; P.E. (Ohio)

Vijay Goel, 2000, professor and chair
B.E., Panjabi University; M.E., Roorkee University; Ph.D., University of New South Wales

Vik J. Kapoor, 1994, professor and director of Nanotechnology Research Center
M.S., Ph.D., Lehigh University

Jian-yu Lu, 1997, professor
B.S.E.E., Fudan University; M.S., Tongji University; Ph.D., Southeast University

Scott C. Molitor, 2000, assistant professor and undergraduate program director
B.S.E., University of Michigan; Ph.D., Johns Hopkins University School of Medicine

Patricia A. Relue, 1993, associate professor and graduate program director
B.S.Ch.E., The University of Toledo; M.S.ChE., Ph.D., University of Michigan

Emeritus Faculty

Frank J. Kollarits, 1980, professor emeritus
B.S., M.S., John Carroll University; Ph.D., The Ohio State University

Demetrios D. Raftopoulos, 1967, professor emeritus
B.S.C.E., Widener College; M.S.C.E., University of Delaware; Ph.D., Pennsylvania State University; P.E. (Pennsylvania, Ohio, New Jersey)

Prestige Faculty

Michael D. P. Boyle, 1998, adjunct professor
B.Sc., University of Glasgow; Ph.D., Chester Beatty Research Institute

Steven L. Britton, 1997, adjunct professor
Ph.D., Texas Tech University School of Medicine

Jeffrey Brown, 2002, adjunct professor
B.S., Trinity College; M.D., University of Chicago

Michael J. Dennis, 1998, adjunct assistant professor
B.S., Xavier University; M.S., University of Cincinnati; Ph.D., University of Texas School of Biomedical Sciences

Sergio Z. deSalles-Cunha, 1997, adjunct assistant professor
M.S., Ph.D., Marquette University

Theodore D. Fraker Jr., 1998, adjunct professor
A.B., Wittenberg University; M.D., The Ohio State University

Gregory M. Georgiadis, 1997, adjunct assistant professor
B.S., Indiana University; M.D., Indiana University School of Medicine

Lucy S. Goodenday, 1998, adjunct associate professor
B.A., Bryn Mawr College; M.D., New York Medical College

Henry Goitz, 2002, adjunct professor
A.B., Cornell University; M.D., Rutgers University

James A. Hampton, 1997, adjunct associate professor
B.S., Ohio University; Ph.D., West Virginia University

Mohamed Samir Hefzy, 1987, professor
Ph.D., University of Cincinnati; PE (Ohio)

James M. Horner, 1998, adjunct associate professor
B.A., Albion College; M.D., University of Michigan

Jerzy Jankun, 1997, adjunct associate professor
M.S., Adam Mickiewicz University; Ph.D., University of Poznan

Steven H. Selman, 1997, adjunct professor
B.S., The University of Toledo; M.D., Case Western Reserve University School of Medicine

Cornel C. VanGorp, 1999, adjunct assistant professor
B.A., Miami University; M.D., Medical College of Ohio

Lars Weidenhielm, 2000, adjunct professor
M.B., Ch.B., Ph.D., M.D., Karolinska Institute

Department of Chemical and Environmental Engineering

Martin A. Abraham, 1996, professor and dean of the Graduate School
B.S.Ch.E., Rensselaer Polytechnic Institute; Ph.D., University of Delaware; PE (Oklahoma)

Abdul-Majeed Azad, 2003, associate professor
B.Sc., Jamshedpur Cooperative College; M.Sc., Ranchi University; Ph.D., University of Madras

John Brace, 2000, research professor
A.B., Wheaton College; PhD., Purdue University

Michael R. Cameron, 1988, research associate professor
B.S.Ch.E., University of Minnesota; M.S.ChE., Ph.D., The University of Toledo

Maria R. Coleman, 1998, professor
B.S., Ch. E., Louisiana Tech University; Ph.D., The University of Texas at Austin; PE (Arkansas)

John P. Dismukes, 1996, professor
B.S., Auburn University; Ph.D., University of Illinois

Isabel C. Escobar, 2000, assistant professor
B.S.Env.E., M.S.Env.E., Ph.D., University of Central Florida

Saleh A. Jabarin, 1987, professor and director of the Polymer Institute
B.A., Dartmouth College; M.S., Polytechnic Institute of New York; Ph.D., University of Massachusetts

Dong-Shik Kim, 2000, assistant professor
B.S.Ch.E., M.S.Ch.E., Seoul National University; Ph.D., University of Michigan

Steven E. LeBlanc, 1980, professor and director of academic affairs
B.S.Ch.E., The University of Toledo; M.S.Ch.E., Ph.D., University of Michigan; PE (Ohio)

G. Glenn Lipscomb, 1994, professor and chair
B.S.Ch.E., University of Missouri - Rolla; Ph.D., University of California - Berkeley

Arunan Nadarajah, 1996, professor and graduate program director
B.Tech.Ch.E., Indian Institute of Technology; M.S.Ch.E., Ph.D., University of Florida

Bruce E. Poling, 1990, professor and director of assessment and planning
B.Ch.E., M.Sc., The Ohio State University; Ph.D., University of Illinois; PE (Missouri)

Constance A. Schall, 1997, associate professor and undergraduate program director
B.S.Ch.E., Cornell University; M.S.Ch.E., Ph.D., Rutgers University; PE (New Jersey)

Sasidhar Varanasi, 1984, professor
B.S.Ch.E., Andhra University; M.S., Indian Institute of Technology; Ph.D., State University of New York

Emeritus and Superannuate Faculty

Gary F. Bennett, 1963, professor emeritus
B.Sc., Queen's University; M.S.E., Ph.D., University of Michigan; PE (Ontario)

Kenneth J. DeWitt, 1965, Distinguished Professor Emeritus
B.S.Ch.E., University of Detroit; M.S.Ch.E., Ph.D., Northwestern University

Millard L. Jones, 1966, professor emeritus
B.S.Ch.E., University of Utah; M.S.Ch.E., Ph.D., University of Michigan

James W. Lacksonen, 1967, professor emeritus
B.Ch.E., M.S., Ph.D., The Ohio State University; PE (Ohio)

Leslie E. Lahti, 1967, professor emeritus
B.S.Ch.E., Tri-State College; M.S.Ch.E., Michigan State University; Ph.D., Carnegie Mellon University, PE (Ohio)

Department of Civil Engineering

Defne Apul, 2004, assistant professor
B.S., Ch.E., Bogazici University; M.S. Env.E., Michigan Technological University; Ph.D., University of New Hampshire; E.I. (New Hampshire)

Yein Juin Eddie Chou, 1989, professor
B.S., M.S.C.E., National Taiwan University; Ph.D., Texas A & M University; PE (Ohio)

Cyndee Gruden, 2003, assistant professor
B.S.C.E, M.S., University of New Hampshire; Ph.D., University of Colorado at Boulder; PE (New Hampshire)

Jiwan D. Gupta, 1980, professor
B.E.C.E, University of Jabalpur; Ph.D., University of Waterloo; PE (Ohio)

Andrew G. Heydinger, 1982, professor and undergraduate program director
B.S.C.E., University of Cincinnati; M.S.C.E., University of Pittsburgh; Ph.D., University of Houston; PE (Ohio)

Ashok Kumar, 1980, professor, acting graduate program director and chair
B.S.E., Aligarth University; M.S., University of Ottawa; Ph.D., University of Waterloo; PE (Alberta)

Douglas K. Nims, 1991, associate professor
B.S.C.E., M.S., The Ohio State University; M.B.A., University of Michigan; Ph.D., University of California - Berkeley; PE (California)

Azadeh Parvin, 1993, associate professor
B.S.C.E., M.S., D.Sc., George Washington University

Mark A. Pickett, 1983, professor
B.S.C.E., Marquette University; M.S.C.E., Ph.D., University of Connecticut; PE (Ohio, Wisconsin)

Brian W. Randolph, 1987, professor and associate dean for undergraduate studies
B.S.C.E., M.S., University of Cincinnati; Ph.D., The Ohio State University; PE (Ohio)

Emeritus Faculty

Donald I. Angelbeck, 1971, professor emeritus
B.S.C.E., M.S.C.E., Washington University; Ph.D., Purdue University; PE (Ohio, Michigan)

Gerald R. Frederick, 1966, professor emeritus
B.S.C.E., The University of Toledo; M.S., Ph.D., Purdue University; PE (Ohio)

Kuan-Chen Fu, 1967, professor emeritus
B.S.C.E., Taiwan College of Engineering; M.S.C.E., Ph.D., University of Notre Dame; PE (Indiana)

Benjamin Koo, 1965, professor emeritus
B.S.C.E., St. John's University in Shanghai; M.S., Ph.D., Cornell University; PE (Ohio, New York)

Naser Mostaghel, 1990, professor emeritus
B.S., Abadan Institute of Technology; M.S., Ph.D., University of California - Berkeley; PE (Iran)

George J. Murnen, 1958, professor emeritus
B.S.C.E., The University of Toledo; M.S., University of Illinois; Ph.D., University of Notre Dame; PE (Ohio)

Department of Electrical Engineering and Computer Science

Mansoor Alam, 1989, professor
B.S.E.E, Aligarth University; M.S., Ph.D., Indian Institute of Science

Gerald R. Heuring, 1987, assistant professor and undergraduate program director
B.S.C.S.E., B.S.I.E., M.S.I.E., The University of Toledo; Ph.D., University of Illinois - Urbana/Champaign

Mohsin M. Jamali, 1984, professor
B.S.E.E., Aligarth University; M.S.E.E., University of Saskatchewan; Ph.D., University of Windsor

Anthony D. Johnson, 1988, associate professor
Dip. Ing. (Electrical Engr.), Ph.D., University of Belgrade

Vikram J. Kapoor, 1994, professor and director of Nanotechnology Research Center
M.S., Ph.D., Lehigh University

Devinder Kaur, 1989, associate professor
M.S. (Physics), Panjab University; M.S. (Medical Physics), University of Aberdeen; M.S., Ph.D., Wayne State University

Junghwan Kim, 1988, professor and graduate director
B.S., Seoul National University; M.S., Ph.D., Virginia Polytechnic Institute & State University; PE (Ohio)

Roger J. King, 1983, professor and interim chair
B.S.E.E., M.S.E.E., Ph.D., The University of Toledo; PE (Ohio)

Henry F. Ledgard, 1989, professor
B.S. (E.E.), Tufts University; M.S., Ph.D., Massachusetts Institute of Technology

Wei Li, 2002, associate professor
B.S., Shaanxi Normal University; M.S., University of Hebei Technology; Ph.D., Chinese Academy of Sciences

Kami Makki, 2003, assistant professor
B.S., M.S., University of Tehran; Ph.D., University of Queensland

Lawrence Miller, 2000, assistant professor
B.A.C.S., University of Texas - Austin; M.S.C.S., Southwest Texas State University; Ph.D., University of Houston

Ezzatollah Salari, 1985, professor
B.S.E.E., Iran College of Science & Technology; M.S., Ph.D., Wayne State University

Gursel Serpen, 1993, associate professor
B.S.E.E., Air Force Academy - Turkey; M.S.E.E., Air Force Institute of Technology; Ph.D., Old Dominion University

Hilda M. Standley, 1979, associate professor
B.S., Michigan State University; M.S., Northwestern University; Ph.D., The University of Toledo

Thomas A. Stuart, 1975, professor
B.S.E.E., University of Illinois; M.E., Ph.D., Iowa State University; PE (Ohio)

M. Afzal Upal, 2003, assistant professor
B.S.C., M.S.C., University of Saskatchewan; Ph.D., University of Alberta

Emeritus Faculty

John Hemdal, 1986, professor emeritus
B.S.E.E., M.S.E.E, Ph.D., E.E., Purdue University

Adel H. Eltimsahy, 1968, professor
B.S.E.E., Cairo University; M.S.E.E., Ph.D., University of Michigan

Donald J. Ewing, 1954, professor emeritus
B.S.E.E., The University of Toledo; M.S.E.E., Massachusetts Institute of Technology; Ph.D., University of Wisconsin

Adel A. Ghandakly, 1979, professor
B.S.E.E., University of Alexandria; M.S.E.E., Ph.D., University of Calgary; PE (Alberta)

Subhash Kwatra, 1977, professor emeritus
B.E., M.E., Birla Institute; Ph.D., University of South Florida

Richard G. Molyet, 1980, professor emeritus
B.S.E.E., M.S.E.E., Ph.D., The University of Toledo

Edwyn D. Smith, 1982, professor
A.A., Phoenix College; B.S.E.E., M.S.E.E., Ph.D., University of Arizona; PE (Ohio)

Prestige Faculty

Xunming Deng, 1996, adjunct professor
M.S., Ph.D., University of Chicago

Mary Lou Dorf, 1990, adjunct associate professor
B.A., Alma College; M.A. (Mathematics), Ph.D., The University of Toledo

Department of Mechanical, Industrial and Manufacturing Engineering

Robert J. Abella, 1988, associate professor
B.S.M.E., M.S.I.E., Ph.D., The University of Toledo

Abdollah A. Afjeh, 1984, professor and chair
B.S.M.E., Arya Mehr University of Technology; M.S.M.E., Ph.D., The University of Toledo; PE (Ohio)

Leslie Berhan, 2004, assistant professor
B.S., University of West Indies; M.S., M. I. T., Ph.D., University of Michigan

Robert A. Bennett, 1985, professor
B.S., M.S., Ph.D., Wayne State University; M.B.A., The University of Toledo

Mohamed Elahnia, 2004, assistant professor
B.S., KN Toosi University of Technology; M.S. Tehran Polytechnic; M.S. Villanova University; Ph.D., Virginia Polytechnic University

Ali Fatemi, 1987, professor
B.S.C.E., M.S.C.E., Ph.D., University of Iowa

Mohamed Samir Hefzy, 1987, professor, graduate program director and interim associate dean
B.S., Cairo University; B.S., Ainshams University; M.S., Ph.D., University of Cincinnati; PE (Ohio)

Duane Hixon, 2000, assistant professor
B.S., M.S. Ph.D. Georgia Institute of Technology

Ahalapitiya H. Jayatissa, 2003, assistant professor
B.Sc., M.Phil., University of Ruhuna, Sri Lanka; Ph.D., Shizuoka University

Theo G. Keith, 1971, Distinguished University Professor
B.M.E., Fenn College; M.S.M.E., Ph.D., University of Maryland

Steven N. Kramer, 1973, professor
B.S.M.E., M.S.M.E., Ph.D., Rensselaer Polytechnic Institute; PE (Ohio)

Ioan D. Marinescu, 1997, professor and director of Precision Micro-Machining Center
B.S., M.S., Polytechnic Institute of Budapest; Ph.D., University of Galatzi

K. Cyril Masiulaniec, 1982, associate professor
B.S.M.E., M.S.M.E., Ph.D., The University of Toledo; PE (Ohio)

Nagi G. Naganathan, 1986, professor and dean
B.S.M.E., University of Madras; M.S.M.E., Clarkson University; Ph.D., Oklahoma State University

Tsung-Ming Terry Ng, 1991, professor
B.S., M.S., University of Wisconsin; Ph.D., University of California - Berkeley

Efstratios Nikolaidis, 2000, professor
B.S.E., National Technical University of Athens; M.S., Ph.D., University of Michigan

Douglas L. Oliver, 1985, associate professor and undergraduate program director
B.A., University of Washington; M.S.M.E., Ph.D., Washington State University; PE (Ohio)

Walter W. Olson, 1997, professor
B.S., U.S. Military Academy; M.S.M.E., Ph.D., Rensselaer Polytechnic Institute; PE (Virginia)

Mehdi Pourazady, 1986, associate professor
B.S.M.E., University of Science & Technology - Iran; M.S.M.E., University of Michigan; Ph.D., University of Cincinnati

Phillip R. White, 1979, professor
B.S.M.E., The University of Toledo; M.S.M.E., Ph.D., Purdue University

Hongyan Zhang, 2000, professor
B.S., Jilin University; M.S., Institute of Metal Research, Chinese Academy of Sciences; Ph.D., The Ohio State University

Department of Engineering Technology

Linda J. Bode, 1985, assistant professor
A.A.S., B.E.T., M.A., The University of Toledo

Chitrasmitha Mathukumalli, 2005, lecturer
B.E., Osmania University; M.S., Gannon University

Joe P. Elmers, 1990, assistant professor
M.S., California Institute of Technology

William T. Evans, 1986, associate professor
B.S.E.E., University of Illinois; M.S.E.E., Ph.D., The University of Toledo; PE (Ohio, Indiana)

Ahmad Farhoud, 2000, assistant professor
B.S., M.S., Ph.D., The University of Toledo

Ella Fridman, 1993, assistant professor and graduate program director (M.S. in engineering)
B.S., M.S.M.E., Ph.D., Kiev University

Cyrus K. Hagigat, 2002, assistant professor
B.S.M.E., University of Maryland; M.S.C.S., Central Michigan University; M.S.M.E., University of Akron; Ph.D., Case Western Reserve University; PE (Ohio)

James L. Kamm, 1974, professor
B.S., Carnegie Institute of Technology; Ph.D., The Ohio State University

Norman A. Koenigsecker, 1988, associate professor
B.S.M.E., M.S.Ed., The University of Toledo; PE (Ohio, Michigan, Indiana)

Nicholas Kissoff, 1999, associate professor and director of undergraduate program (C.E.T.)
B.S., M.S., Ph.D., The University of Toledo; PE (Ohio, Michigan)

Stephen Krone, 2005, associate professor
B.S., Virginia Polytechnic University; B.S.C.E., University of Maryland; M.S., D.S.C., George Washington University; PE (Ohio)

Larry Loy, 2004, visiting assistant professor, B.S.C.E., The University of Toledo; PE, PS (Ohio)

Ganapathy V. Narayanan, 2003, assistant professor
B.Tech., M.Tech., Indian Institute of Technology; Ph.D., University of Minnesota

Frederick J. Nelson, 1985, associate professor and director of undergraduate program (E.E.T.)
B.A., Northern Michigan University; M.S., Michigan State University

Mohammed Y. Niamat, 1990, professor
B.Sc. (E.E.), M.E., Aligarth University; M.Sc., University of Saskatchewan; Ph.D., The University of Toledo

Allen Rioux, 1986, associate professor, director of undergraduate program (C.S.E.T.), and director of online services
B.S., The University of Toledo; M.S., University of Michigan

Richard Tabb Schreder, 1986, associate professor and director of undergraduate program (M.E.T.)
B.S.M.E./I.E., M.S.E.S., The University of Toledo; PE (Ohio)

Dale E. Simon, 1980, assistant professor
B.S.M.E., Lawrence Institute; M.S.I.E., The University of Toledo

Daniel J. Solarek, 1977, professor and chair
B.A., B.A.Ed., Western Washington University; M.S.E.E., San Diego State University

Richard A. Springman, 1979, instructor and director of student support
B.M.E., M.S.M.E, The Ohio State University; PE (Ohio)

Emeritus and Superannuate Faculty

Daryl R. Blanchard, 1969, professor emeritus
B.S. Architecture, University of Cincinnati; Registered Architect (Ohio)

J. William Haskins, 1969, professor emeritus
B.S., Duke University; M.Ed. (General Engineering), Pennsylvania State University

Ted F. Horst, 1967, professor emeritus
B.S.C.E., The University of Toledo

James F. Machen, 1954, professor emeritus
B.S.M.E., M.B.A., The University of Toledo; M.S.E., University of Michigan; PE (Ohio)

Thomas J. Minter, 1967, professor emeritus
B.A., Oklahoma City University; M.E., University of Oklahoma; Ph.D., The University of Toledo

John D. Rich, 1988, professor emeritus
B.S.E.E., University of Michigan; B.S. (Mathematics and Physics), Albion College