School of Engineering

Eddy M. Rojas, Dean
Riad S. Alakkad, Associate Dean for Undergraduates Studies
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Our Vision

The Vision of the School of Engineering is to become a preeminent engineering school providing transformational learning experiences that prepare engineering students for leadership, service and success in life, profession and society. It is our goal to be recognized for outstanding engineering research that positively advances the human condition, addresses critical needs of the world and provides economic growth to our region, our nation and our world. Finally, we are committed to being a nurturing, inclusive environment that promotes the development of all members of the School of Engineering family to their full potential while supporting and advancing the Catholic and Marianist mission of the University of Dayton.

Our Mission

The Mission of the School of Engineering is to educate complete professionals who have an integrated knowledge of the theory and practice of engineering together with an equally strong understanding of the arts and sciences that will prepare them for fulfilling careers of leadership, service and life-long learning for the good of society.

Our Purpose

The School of Engineering has as its primary purpose the education of men and women toward a profound knowledge that engineering is more than a problem-solving discipline. While our curriculum and our research do not directly address issues of faith, we nonetheless affect in many ways the character and sensibilities of our students, not just as problem solvers but as individuals who respect the world that they shape for the good of others. Accordingly, our students receive an education that is rigorously directed toward advanced knowledge in engineering, while demonstrating at every turn the important relationships and interdependencies that exist between engineering and the rest of the disciplines across the full spectrum of human knowledge. We therefore educate students to be both intellectually astute and discerning in all their work and morally responsible in the face of the demands and rewards of our ever-changing world.

As an educational unit of a private university, the School of Engineering strongly emphasizes the advising of students so that they may achieve their educational objectives within the engineering program. First-year students are advised by an advising team. At the end of the second semester, each student is assigned a faculty advisor in his/her program. Academic advising begins before the students begin their formal course work and continues as they progress toward their objectives.

The broader responsibilities of the engineering profession demand that the professional education of an engineer include a significant component of humanities, ethics and social science studies so that the student will become aware of the urgent problems of society and develop a deeper appreciation of the cultural achievements of humanity. Additionally, such studies provide the proper framework to ensure that scientific discoveries and developments by engineers may result in the true advancement of the human race.

Academic Programs

The engineering program in each of the fields of chemical (p. 355), civil (p. 362), computer (p. 368), electrical (p. 368) and mechanical engineering (p. 391) is designed to lead to a bachelor's degree in a four-year period. While students pursue curricula they themselves have chosen according to their fields of interest, they all take certain core courses in mathematics, chemistry, physics, English and engineering fundamentals. All of the programs permit additional specialization (as an overload) in minors in areas such as aerospace engineering (p. 393), bioengineering (p. 357), chemical processing (p. 358), composite materials engineering (p. 358), computer systems (p. 370), engineering management (p. 374), engineering mechanics (p. 363), environmental engineering (p. 363), materials engineering (p. 358), mechanical systems (p. 393), operations engineering (p. 375),polymer materials (p. 359), signals and systems (p. 370), structures (p. 364), transportation engineering (p. 364) and water resources engineering (p. 364) in the School of Engineering and in other areas such as languages, music and political science in other units of the University. Concentrations in the School of Engineering include aerospace engineering (p. 392), electro-optics (p. 369), energy systems-chemical (p. 357), energy systems-mechanical (p. 392) and robotics (p. 370). Although emphasis is on fundamental theories, continued attention is paid to the solution of practical problems which the student will encounter in the practice of engineering.

The programs in chemical engineering, civil engineering, computer engineering, electrical engineering and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.

The programs in electronic and computer, industrial, global manufacturing systems and mechanical engineering technology are accredited by the Engineering Technology Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.

Courses

EGR 100. Enrichment Workshop. 0 Hours
A workshop structured to provide collaborative learning of engineering calculus facilitated with upper-class engineering students. Required course both semesters for first-year students.

EGR 102. Seminar for Undergrad Engineering Students. 0 Hours
Introduction to engineering faculty, facilities, and curriculum; survey of career opportunities in engineering; orientation to the university. This course is part of the Integrated Engineering Core for all engineering students.

EGR 103. Engineering Innovation. 2 Hours
First year multi-disciplinary innovation projects primarily geared towards skill development in the areas of requirements analysis, creativity, conceptual design, design and problem-solving processes, prototyping, teamwork, and project communications. Application to the development of a new product or technology meeting societal needs. This course is part of the Integrated Engineering Core for all engineering students.

EGR 198. Multidisciplinary Research & Innovation Laboratory. 1-6 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

EGR 200. Professional Development Seminar. 0 Hours
Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all sophomore students.

EGR 201. Engineering Mechanics. 3 Hours
This course provides an introduction to mechanics as applied to engineering problems. Principles of force and moment balance, work, and energy conservation are applied to systems in static equilibrium. The similarity of balance laws applied to mechanical behavior to those used in thermodynamics and electric circuits is introduced. Students are introduced to the concepts of free-body diagrams and equivalent systems of forces, properties of areas and sections, analysis of simple structures, internal forces, stress, and material failure. Introduces a common problem-solving approach and processes to address and solve open ended problems and creative application of theory. Both analytical and computer solutions of engineering mechanics problems are emphasized. This course is part of the Integrated Engineering Core for all engineering students. Prerequisite(s): MTH 168; PHY 206.

EGR 202. Engineering Thermodynamics. 3 Hours
This course provides an introduction to engineering thermodynamics, emphasizing the vital importance of energy generation and efficiency from a multi-disciplinary perspective. State descriptions of pure substances and mixtures. Control volume analysis and conservation principles applied to systems with respect to mass, energy, and entropy with applications to power, refrigeration, chemically reacting and other energy conversion systems. Introduces a common problem-solving approach and processes to address real, open ended problems and creative application of theory. Both analytical and computer solutions of engineering thermodynamics problems are emphasized. This course is part of the Integrated Engineering Core for all engineering students. Prerequisite(s): MTH 168.

EGR 203. Electrical & Electronic Circuits. 3 Hours
This course provides an introduction to the discipline of Electrical and Computer Engineering. Covers principles of linear circuit analysis and problem solving techniques associated with circuits containing both passive and active components. Students are introduced to DC circuit analysis, AC circuit analysis, and transient circuit analysis. Applications of basic electronic devices including diodes, transistors, and operational amplifiers are studied. Both analytical and computer solutions of electrical and electronic circuit problems are emphasized. This course is part of the Integrated Engineering Core for all engineering students. Prerequisite(s): MTH 168.

EGR 203L. Electrical and Electronic Circuits Lab. 1 Hour
Laboratory investigate of basic electrical and electronic circuits. Introduction to laboratory reporting, safety, and instrumentation. (1 semester hour). Corequisite(s): EGR 203.

EGR 298. Multidisciplinary Research & Innovation Laboratory. 1-6 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

EGR 299. Innovation Design & Entrepreneurship. 3 Hours
No description available.

EGR 308. Engineering for the Performing Arts. 3 Hours
Experiential course exploring the best practices and upcoming trends in the materials, methods, and procedures used in engineering scenic environments for the performing arts, through the integration of the technical Theatre and Engineering disciplines. This course will provide students with practical experience in working with performance technology industry partners through the testing of emergent performance technology for product development and the uses of this technology to help support arts education needs in our community. Open to all university students.

EGR 311. Principles of Nanotechnology. 3 Hours
Nanoscale properties: optical, mechanical and thermal effects at the nanoscale, quantum confinement effects. Fabrication techniques: top downand bottom up techniques; nano-patterning, thin films. Nanometrology: scanning electron microscope, atomic force and microscope. Nanoelectronics: single electron devices, grapheme and carbon nanotube electronics. Carbon nanotubes, quantum dots, nanophotonics.

EGR 320. Systems Design Scholars Seminar. 3 Hours
Interdisciplinary systems-design experience to emphasize the basic problem-solving approach and philosophy of engineering for students of varied backgrounds. By permission only.

EGR 323. Project Management. 3 Hours
No description available.

EGR 330. Engineering Design & Appropriate Technology. 0-3 Hours
An experiential course in appropriate technology and engineering design which spans the winter and summer semesters and includes language preparation, cultural immersion, selected readings, and discussions on appropriate technology and a six to sixteen week summer service-learning experience focused on technical or engineering related work in a developing country. Prerequisite(s): Junior or senior status; permission of instructor.

EGR 398. Multidisciplinary Research & Innovation Laboratory. 1-3 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

EGR 411. Advanced Nanotechnology. 3 Hours
Nanotechnology in information, energy, fabrication and metrology: data storage, nanoelectronics, 3-D transistors; nanomaterials in photovoltaics, fuel cells; thin films, optical and non-optical lithography, MEMS, nanofabrication processes; scanning electron microscopy.

EGR 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

EGR 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): EGR 493.

EGR 499. Engineering Systems Design. 3 Hours
This course will provide students of varied backgrounds with an interdisciplinary systems-design experience of applying basic engineering problem-solving and process-oriented approaches to a set of case studies while examining those case studies through different philosophical perspectives on engineering itself.

Bachelor's Plus Master's Program

The School of Engineering offers a combined program leading to both a bachelor's degree in an engineering major and a master's degree. Physics majors (College of Arts and Sciences) may also participate. The program is designed for the qualified student who wishes to pursue either greater specialization in a major area or to complement the undergraduate program with a related graduate-level concentration. Most students who select the program have received some advanced placement upon entry to engineering at the first-year level or take occasional summer courses.

The formal request for entrance into this program may be made as early as before the first semester of the student's junior year, but the student should consult their department to determine exactly when this request should be made. Admission requirements include a minimum cumulative grade point average of 3.00 and permission from the chairperson of the department corresponding to the student's undergraduate major and chair/program director of selected master's program. Students must formally apply to the graduate school during their senior year. Selection of the graduate (master's) program area is indicated below:

Undergraduate Program	Graduate Program Selections
Chemical Engineering	Bioengineering, Chemical Engineering, Civil Engineering, Electro-Optics*, Engineering Management, Engineering Mechanics, Management Science, Materials Engineering, Renewable and Clean Energy
Civil Engineering	Bioengineering, Civil Engineering, Engineering Management, Engineering Mechanics, Management Science, Materials Engineering, Renewable and Clean Energy
Computer Engineering	Bioengineering, Civil Engineering, Electrical Engineering,Electro-Optics*, Engineering Management, Engineering Mechanics, Management Science, Materials Engineering, Renewable and Clean Energy
Electrical Engineering	Bioengineering, Civil Engineering, Electrical Engineering, Electro-Optics, Engineering Management, Engineering Mechanics, Management Science, Materials Engineering, Renewable and Clean Energy
Mechanical Engineering	Aerospace Engineering, Bioengineering, Civil Engineering, Electro-Optics*, Engineering Management, Engineering Mechanics, Management Science, Materials Engineering, Mechanical Engineering, Renewable and Clean Energy
Engineering Technology	Engineering Management, Management Science, Materials Engineering
Physics	Electro-Optics, Materials Engineering

* This major may need additional courses to qualify for the master's program.

The department chairperson and the graduate program director serve as an advisory committee to the student in establishing the combined program requirements. The first-year, sophomore and junior years follow the curriculum of the student's selected bachelor's program.

A student who elects the combined program must satisfy both undergraduate and graduate degree requirements as to required cumulative grade point average for graduation. The graduate of the combined program will receive a bachelor's degree in the undergraduate major (e.g., Bachelor of Mechanical Engineering) and a master's degree in the graduate area (e.g., Master of Science in Materials Engineering). A student in the 5-year combined program who chooses not to complete the program must complete all the undergraduate major program requirements to receive the bachelor's degree.

Course Area	Semester	Hours
Senior Year	1st Term	2nd Term
Undergraduate department major	11	11
Undergraduate department or University requirement or electives	3	3
Graduate major (taken as graduate credit)	3	3
Total semester hours	17	17
Fifth Year		
Graduate major (including thesis or project)*	12	12

* Civil Engineering majors require three additional semester hours for project option.

Degree Requirements

A student enrolls in the curriculum prescribed for the academic year in which he or she is registered as a first-year student at the University of

Dayton or elsewhere. If for any reason it is necessary or desirable to change to a subsequently established curriculum, the student must meet all of the requirements of the new curriculum.

The degrees Bachelor of Chemical, Civil, Electrical or Mechanical Engineering, Bachelor of Science in Computer Engineering and Bachelor of Science in Engineering Technology are conferred at commencement if the general requirements enumerated here (p. 16) have been fulfilled as well as those listed below:

1. All bachelor's degrees granted by the University of Dayton require a cumulative grade point average of at least 2.0.
2. The cumulative grade-point average in all courses which have an engineering prefix must be at least 2.0 (C average).
3. All prescribed courses outlined in the respective curricula must have been passed with grades of D or better. Although courses may be scheduled in terms other than as listed, all prerequisites and corequisites must be met.
4. All students in the School of Engineering must register under Grade Option 1 for all courses in engineering, mathematics, and science except those offered only under Grade Option 2.
5. The student must have taken their last 30 semester hours through the School of Engineering at the University of Dayton.

The semester hours of credit required for graduation in each engineering curriculum administered by the School of Engineering are as follows:

Bachelor of Chemical Engineering	137
Bachelor of Civil Engineering	138
Bachelor of Electrical Engineering	134
Bachelor of Mechanical Engineering	132
Bachelor of Science in Computer Engineering	137

The semester hours of credit required for graduation in each engineering technology curriculum administered by the School of Engineering are as follows:

Bachelor of Science in Engineering Technology

Electronic and Computer Engineering Technology Major	131
Global Manufacturing Systems Engineering Technology Major	131
Industrial Engineering Technology Major	131
Mechanical Engineering Technology Major	132

ETHOS

Engineers in Technical, Humanitarian Opportunities of Service-Learning

The ETHOS Program is founded on the belief that engineers are more apt and capable of serving our world appropriately when they have experienced opportunities that increase their understanding of technology's global linkage with values, culture, society, politics and economy. ETHOS seeks to provide these opportunities through international and domestic service internships as well as through collaborative research and hands-on classroom projects that support the development of appropriate technologies for the developing world.

Such experiences expose students to alternative nontraditional technologies that are based on fundamental science and engineering principles and at the same time provide tangible and immediate impacts improving the lives of those who use them. ETHOS maintains as its educational objective to challenge students to think creatively and independently, to work as a team and communicate effectively, and to address issues of appropriate technology, environmental ethics, social responsibility and cultural sensitivity.

Engineering First-Year Requirements

Students who are recent high school graduates or who have earned fewer than 15 semester hours of collegiate credit are classified as first-year students and must meet common engineering program requirements. Such credit requirements may be met in a number of ways, including:

1. Advanced college-level course work at the University of Dayton or other collegiate institutions,
2. Advanced placement examinations,
3. Departmental examinations during the first term, or
4. Taking the prescribed courses as part of the first year.

Required First-Year Program		32-35
CHM 123	General Chemistry	3
CMM 100	Principles of Oral Communication	3
EGR 100	Enrichment Workshop [1]	0
EGR 103	Engineering Innovation	2
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	3-6
or ENG 200H	Writing Seminar II	
HST 103	The West & the World [2]	3
MTH 168 & MTH 169	Analytic Geometry & Calculus I and Analytic Geometry & Calculus II	8
PHL 103	Introduction to Philosophy	3
PHY 206	General Physics I - Mechanics [3]	3
REL 103	Introduction to Religious and Theological Studies	3
Basic Science Laboratory [4]		1
First-Year Student Orientation		0-1
Programming [5]		0-4

1 Required both semesters.

2 Chemical engineering students must take CHM 124 and CHM 124L in the second semester and postpone one of the three Humanities Base courses until the third semester.

3 Engineering students take this requirement first or second semester of the first year.

4 Chemical, civil, and mechanical engineering students must take CHM 123L; computer and electrical engineering students take PHY 210L.

5 Chemical, mechanical and civil engineering students are not required to take any programming course in the first year. Computer and electrical engineering students must take CPS 150 in the second semester. Mechanical engineering students take MEE 104L in the second semester of the first year.

Engineering Technology

The School of Engineering also offers a Bachelor of Science in Engineering Technology. The programs in which the degree is offered are:

- Electronic and Computer Engineering Technology
- Global Manufacturing Systems Engineering Technology

- Industrial Engineering Technology
- Mechanical engineering Technology

Students in Engineering Technology programs participate in an integrated education core in which they study specialized technical courses that emphasize rational thinking and the application of engineering and scientific principles to the practical solution of technological problems. Extensive laboratory experience aids the students in the design, analysis and implementation of systems, as well as experiencing real-world application problems. The multidisciplinary curriculum culminates in a capstone design project. All programs offer a cooperative education program in which the student is allowed to alternate work and study semesters after the first year. Additionally, many students acquire experience through internships, summer work or study abroad.

Graduates are critical thinkers who can apply established scientific and engineering knowledge to implement systems, and who are prepared to take places in society as responsible, humane and complete professionals. They work effectively on multidisciplinary design teams building complex systems. Graduates are usually involved in the design, performance evaluation, service and sales of products, equipment, and manufacturing systems or the management of these activities. Several years after graduation, they may find themselves in management positions.

TRANSFER STUDENTS

The engineering technology programs welcome transfer students from associate degree programs in engineering technology who wish to pursue the Bachelor of Science in Engineering Technology. Graduates of two-year associate degree programs in engineering technology should normally expect to undertake at least two additional years of work for the bachelor's degree.

MINORS IN ENGINEERING TECHNOLOGY

Students majoring in any engineering technology program may earn a minor in another engineering technology program by completing 12 approved semester hours of work in the second discipline. Courses already required in the student's program may not be counted in the minor. The director of the program in which the minor is to be earned is responsible for approving the list of courses for the minor.

The minors available to engineering technology students are:

- Automotive Systems
- Electronic and Computer Engineering Technology
- Global Manufacturing Systems Engineering Technology
- Industrial Automation and Applied Robotic Systems
- Industrial Engineering Technology
- Integrated Arts and Technology
- Mechanical Engineering Technology
- Quality Assurance
- Sustainable Manufacturing

A minor in Engineering Technology is also offered for students enrolled in majors in the College of Arts and Sciences, the School of Business Administration, and the School of Education and Health Sciences.

ACCREDITATION

The programs in electronic & computer, global manufacturing systems, industrial, and mechanical engineering technology are accredited by the Engineering Technology Accreditation Commission of ABET 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700.

ENGINEERING TECHNOLOGY FIRST-YEAR REQUIREMENTS

Students selecting any of the four engineering technology majors should take the courses prescribed under the Sample Plan of Study. Undeclared engineering technology students should follow the first-year schedule below.

Total first-year requirements:

CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
EGR 103	Engineering Innovation	2
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	6
or ENG 200H	Writing Seminar II	
HST 103	The West & the World	3
MCT 110L	Technical Drawing & CAD Laboratory	2
MTH 137 & MTH 138	Calculus I with Review and Calculus I with Review	8
PHL 103	Introduction to Philosophy	3
REL 103	Introduction to Religious and Theological Studies	3
SET 100	Introduction to Engineering Technology I	0
SET 101	Introduction to Engineering Technology II	0
SET 153L	Technical Computation Laboratory	1
Total Hours		32

Optional Cooperative Education

Cooperative education offers the student the opportunity to put classroom work into practical use while still in school, resulting in early career identification and greater motivation as well as providing a source of funds. All students majoring in engineering and engineering technology may participate in the cooperative education program. To be eligible, students must have completed three semesters and have a cumulative grade-point average of not less than 2.3. Those applying for the program will be accepted on the basis of grade-point average, motivation and attitude. The number of students placed depends on the availability of jobs. Students alternate full-time semesters of work with full-time school semesters.

Programs of Study

To learn more about the available programs in the School of Engineering, explore the departments:

- Chemical and Materials Engineering (p. 355)
- Civil and Environmental Engineering and Engineering Mechanics (p. 362)
- Electrical and Computer Engineering (p. 367)
- Engineering Management (p. 374)
- Engineering Technology (p. 375)
- Mechanical and Aerospace Engineering (p. 391)

Chemical and Materials Engineering

Major:

- Bachelor of Chemical Engineering

Concentration:

- Energy Systems-Chemical

Minors:

- Bioengineering
- Chemical Processing
- Composite Materials Engineering
- Energy Production Engineering
- Materials Engineering
- Polymer Materials

The Chemical and Materials Engineering Department offers an undergraduate program leading to a Bachelor of Chemical Engineering degree. Chemical engineering applies the principles of the physical sciences, economics, and human relations to research, design, build, and supervise facilities that convert raw materials into useful products and services.

The majority of chemical engineers are involved in the chemical process industries that produce many of the materials and items needed in everyday life. These include medicine, food, fertilizers, plastics, synthetic fibers, petroleum, petrochemicals, ceramics, and pulp and paper products. A chemical engineer may pursue a professional career in many other fields, such as energy conversion, pollution control, medical research, and materials development in aerospace and electronic industries. Chemical engineers are employed in research, development, design, production, sales, consulting, and management positions. They are also found in government and academia. Many use a chemical engineering education as a pathway to law, medicine, or corporate management.

The curriculum in chemical engineering serves as basic training for positions in these diverse areas of the manufacturing industry or for graduate study leading to advanced degrees. The first part of the chemical engineering curriculum provides a firm foundation in mathematics, physics, and chemistry. The chemistry background is stressed. The second part of the curriculum offers a balance between classroom and laboratory experience in stressing chemical engineering topics such as transport phenomena, thermodynamics, kinetics and reactor design, separation processes, fluid flow and heat transfer operations, process control, and process design. The development of design tools, communication, and interpersonal skills is integrated throughout the curriculum. The curriculum allows minors in emerging technologies such as bioengineering, environmental engineering, and materials engineering. Those interested in attending medical/dental school can pursue a premed preparation as part of their curriculum.

The educational objectives of chemical engineering program graduates:

- have successful careers in the chemical process industry with the skills necessary to have opportunities to work in non-traditional industries and positions
- be successful at prestigious graduate, medical, and law schools
- be committed to performing ethically while serving their professions, companies, and communities
- exhibit strong critical thinking skills from the breadth of their general education and the depth of their foundation in engineering principles, and engage in continuous intellectual and personal growth

Faculty

Charles E. Browning, Department Chairperson
Michael Elsass, Chemical Engineering Director
Professors Emeriti: Lu, Snide
Professors: Browning, Eylon, Lafdi, Lee, Myers, T. Saliba, Sandhu, Wilkens
Associate Professor: D. Comfort
Assistant Professors: K. Comfort, Vasquez
Senior Lecturer: Ciric
Lecturer: Elsass

Bachelor of Chemical Engineering (CME) minimum 137 hours

Common Academic Program (CAP)		
*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements		
CHM 123	General Chemistry	3
CHM 124	General Chemistry	3
CHM 313	Organic Chemistry	3
CHM 313L	Organic Chemistry Laboratory	1
CHM 314	Organic Chemistry	3
CHM 314L	Organic Chemistry Laboratory	1
CME 101	Introduction to Chemical Engineering (2 semesters)	0-1
CME 200	Professional Development Seminar (2 semesters)	0-1
CME 203	Material & Energy Balances	3

CME 281	Chemical Engineering Computations	3
CME 306	Chemical Reaction Kinetics & Engineering	3
CME 311	Chemical Engineering Thermodynamics	3
CME 324	Transport Phenomena I	3
CME 325	Transport Phenomena II	3
CME 326L	Transport Phenomena Laboratory	1-2
CME 365	Separation Techniques	3
CME 381	Advances Mathematics for Chemical Engineers	3
CME 408	Seminar (2 semesters)	0-1
CME 430	Chemical Engineering Design I	3
CME 431	Chemical Engineering Design II	3
CME 452	Process Control	3
CME 453L	Process Control Laboratory	2
CME 465	Fluid Flow & Heat Transfer Processes	3
CMM 100	Principles of Oral Communication	3
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
EGR 201	Engineering Mechanics	3
EGR 202	Engineering Thermodynamics	3
EGR 203	Electrical & Electronic Circuits	3
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	3-6
or ENG 200H	Writing Seminar II	
HST 103	West and the World	3
or HST 198	History Scholars' Seminar	
MTH 168	Analytic Geometry & Calculus I	4
MTH 169	Analytic Geometry & Calculus II	4
MTH 218	Analytic Geometry & Calculus III	4
MTH 219	Applied Differential Equations	3
PHL 103	Intro To Philosophy	3
PHY 206	General Physics I - Mechanics	3
PHY 207	General Physics II - Electricity & Magnetism	3
REL 103	Introduction to Religious and Theological Studies	3
SSC 200	Social Science Integrated	3
Chemistry or Biology elective [1]		3
CME elective [1]		3
Elective [2]		3
Electives		12
Engineering/Science electives [6]		1
Total Hours		137

1. Must be selected from list approved by the Chemical and Materials Engineering Department.
2. Must be selected from approved list of PHL or REL ethics courses.

Concentration in Energy Systems-Chemical (CES)

This concentration is open to all engineering students. The Energy Systems Concentration provides an interdisciplinary concentration in energy systems and its social consequences. Students completing this concentration will be prepared for jobs in both industrial and building energy systems, a rapidly growing market.

ASI 320	Cities & Energy [1,2]	3
CME 203	Material & Energy Balances	3
CME 311	Chemical Engineering Thermodynamics	3
CME 324	Transport Phenomena I	3
CME 325	Transport Phenomena II	3
CME 326L	Transport Phenomena Laboratory	1-2
CME 430	Chemical Engineering Design I	3
CME 431	Chemical Engineering Design II	3
CME 465	Fluid Flow & Heat Transfer Processes	3
CME 466L	Chemical Engineering Unit Operations Laboratory	2
CME elective		
Select one course from:		3
CME 486	Introduction to Petroleum Engineering	
or CME 586	Introduction to Petroleum Engineering	
CME 524	Electrochemical Power	
or MEE 575	Fracture & Fatigue of Metals & Alloys I	
CME 565	Fundamentals of Combustion	
CME 574	Fundamentals of Air Pollution I	
Select two courses from:		6
Select any CME elective course above [3]		
AEE 560	Propulsion Systems	
or MEE 560	Propulsion Systems	
CME 507	Advanced Thermodynamics	
or MEE 511	Advanced Thermodynamics	
CME 579	Materials for Advanced Energy Applications	
or MAT 579	Materials for Advanced Energy Applications	
MEE 413	Propulsion	
or MEE 513	Propulsion	
MEE 420	Energy Efficient Buildings	
or MEE 569	Energy Efficient Buildings	
MEE 471	Design of Thermal Systems	
or MEE 571	Design of Thermal Systems	
MEE 473	Renewable Energy Systems	
or MEE 573	Renewable Energy Systems	
MEE 478	Energy Efficient Manufacturing	
or MEE 578	Energy Efficient Manufacturing	
Total Hours		36-37

1. Or another approved humanities elective related to Energy Systems.
2. Satisfies History requirement.
3. Course cannot have already been chosen as CME elective.

Minor in Bioengineering (BIE)

This minor is open to chemical, civil, computer, electrical, and mechanical engineering majors. The program is designed to expose the student to the use of engineering principles in biological systems and applications.

BIO 151	Concepts of Biology I: Cell & Molecular Biology	3
or BIO 152	Concepts of Biology II: Evolution & Ecology	
CME 490	Introduction to Bioengineering	3
or CME 590	Introduction to Bioengineering	
Select one course from:		3
CME 491	Biomedical Engineering I	3

or CME 591	Biomedical Engineering I	
MEE 430	Biomechanical Engineering	3
or MEE 530	Biomechanical Engineering	
Select one course from: [1]		3
BIE 511	Biomaterials	3
BIE 595	Special Problems in Bioengineering	
BIO 151	Concepts of Biology I: Cell & Molecular Biology	
BIO 152	Concepts of Biology II: Evolution & Ecology	
BIO 312	General Genetics	
BIO 403	Physiology I	
BIO 411	General Microbiology	
BIO 440	Cell Biology	
CHM 420	Biochemistry	
CME 530	Biomaterials	3
CHM 451	General Biochemistry I	
CHM 452	General Biochemistry II	
CME 491	Biomedical Engineering I	3
or CME 591	Biomedical Engineering I	
CME 492	Chemical Sensors & Biosensors	
Total Hours		27

[1] Course cannot have already been chosen above.

Minor in Chemical Processing (CHP)

This minor is open to civil, computer, electrical, and mechanical engineering majors. The program is designed to acquaint the student with industrial operations in the chemical process industries such as heat exchange, distillation, extraction, humidification, etc. The elective courses cover a wide range of topics to accommodate the student's special interests.

CME 203	Material & Energy Balances	3
CME 324	Transport Phenomena I	3
CME 365	Separation Techniques	3
Select one course from:		3
CME 306	Chemical Reaction Kinetics & Engineering	
CME 430	Chemical Engineering Design I	
CME 452	Process Control	
CME 465	Fluid Flow & Heat Transfer Processes	
CME 499	Special Problems in Chemical Engineering	
Total Hours		12

Minor in Composite Materials Engineering (CMA)

This minor is open to chemical, civil, and mechanical engineering majors. The program is designed to expose the student to the design, processing, and characterization of composite materials and their various applications in industry.

CME 510	High Performance Thermoset Polymers	3
or MAT 510	High Performance Thermoset Polymers	
CME 512	Advanced Composites	3
or MAT 542	Advanced Composites	
Select two courses from:		6
CEE 540	Composites Design	
or MAT 540	Composite Design	
CEE 543	Analytical Mechanics Composite Materials	
or MAT 543	Analytical Mechanics of Composite Materials	
CEE 546	Finite Element Analysis I	
or MEE 546	Finite Element Analysis I	
CME 509	Introduction to Polymer Science - Thermoplastics	
or MAT 509	Introduction to Polymer Science-Thermoplastics	
CME 527	Methods of Polymer Analysis	
or MAT 527	Methods of Polymer Analysis	
CME 528	Chemical Behavior of Materials	
or MAT 528	Chemical Behavior of Materials	
CME 580	Polymer Decomposition, Degradation & Durability	
or MAT 580	Polymer Durability	
Total Hours		12

Minor in Energy Production Engineering (EPE)

This minor is open to all engineering majors. A selection of courses covering the production of energy:

Select four courses from:		12
BIE/CME/RCL 533	Biofuel	
CME 486/586	Introduction to Petroleum Engineering	
CME/MEE/RCL 524	Electrochemical Power	
CHM/GEO 234	Energy Resources	
ECE 316	Introduction to Electrical Energy Systems	
ECE 583	Advanced Photovoltaics	
MAT 579	Materials for Advanced Energy Applications	
MEE 473/573/RCL 573	Renewable Energy Systems	
RCL 590	Special Problems in Renewable & Clean Energy [1]	
RCL 590	Special Problems in Renewable & Clean Energy [2]	
RCL 590	Special Problems in Renewable & Clean Energy [3]	
Total Hours		12

[1] Must be Thermal Systems Analysis.

[2] Must be Solar Energy Engineering.

[3] Must be Wind Energy Engineering.

Minor in Materials Engineering (MAT)

This minor is open to all engineering majors. A general overview of materials with choice courses in polymers, composites, nanomaterials, and material characterization.

MAT 501	Principles of Materials I	3
MAT 502	Principles of Materials II	3
Select two courses from:		6
CME 509	Introduction to Polymer Science - Thermoplastics	
or MAT 509	Introduction to Polymer Science-Thermoplastics	
CME 510	High Performance Thermoset Polymers	
or MAT 510	High Performance Thermoset Polymers	

CME 511	Principles of Corrosion	
or MAT 511	Principles of Corrosion	
CME 512	Advanced Composites	
or MAT 542	Advanced Composites	
CME 527	Methods of Polymer Analysis	
or MAT 527	Methods of Polymer Analysis	
CME 528	Chemical Behavior of Materials	
or MAT 528	Chemical Behavior of Materials	
CME 579	Materials for Advanced Energy Applications	
or MAT 579	Materials for Advanced Energy Applications	
CME 580	Polymer Decomposition, Degradation & Durability	
or MAT 580	Polymer Durability	
MAT 504	Techniques of Materials Analysis	
MAT 506	Mechanical Behavior of Materials	
MAT 507	Introduction to Ceramic Materials	
MAT 508	Principles of Material Selection	
MAT 521	NDE/SHM	
MAT 535	High Temperature Materials	
MAT 541	Experimental Mechanics of Composite Materials	
MAT 543	Analytical Mechanics of Composite Materials	
MAT 544	Mechanics of Composite Materials	
MAT 575	Fracture & Fatigue of Metals & Alloys I	
MAT 577	Light Structural Metals	
MAT 590	Selected Readings in Materials Engineering	
MAT 595	Special Problems in Materials Engineering	
MAT 601	Surface Chemistry of Solids	
MAT 604	Nanostructured Materials	
MEE 312	Engineering Materials I	
Total Hours		12

Minor in Polymer Materials (PME)

This minor is open to all engineering majors. Coverage of polymers including thermosets and thermoplastics, and composite materials in which polymers are used as constituents. Methods of polymer processing and polymer characterization are also included.

CME 509	Introduction to Polymer Science - Thermoplastics	3
or MAT 509	Introduction to Polymer Science-Thermoplastics	
CME 510	High Performance Thermoset Polymers	3
or MAT 510	High Performance Thermoset Polymers	
Select two courses from:		6
CME 512	Advanced Composites	
or MAT 542	Advanced Composites	
CME 527	Methods of Polymer Analysis	
or MAT 527	Methods of Polymer Analysis	
CME 528	Chemical Behavior of Materials	
or MAT 528	Chemical Behavior of Materials	
CME 580	Polymer Decomposition, Degradation & Durability	
or MAT 580	Polymer Durability	
MAT 540	Composite Design	
MAT 543	Analytical Mechanics of Composite Materials	
Total Hours		12

First Year

Fall	Hours	Spring	Hours
CME 101	0-1	CHM 124	3
CHM 123 (Satisfies CAP Natural Science)	3	CHM 124L	1
CHM 123L	1	CME 101	0-1
ENG 100 (Satisfies CAP Writing Seminar Requirement)	3	EGR 100	0
EGR 100	0	HST 103 (Satisfies CAP First Year Humanities Common	3
EGR 103	2	MTH 169	4
MTH 168 (Satisfies CAP Math Requirement)	4	PHY 206 (Satisfies CAP Natural Science)	3
PHL 103 (Satisfies CAP First Year Humanities Common)	3	REL 103 (Satisfies CAP First Year Humanities Common	3
	16-17		**17-18**

Second Year

Fall	Hours	Spring	Hours
CHM 313	3	CHM 314	3
CHM 313L	1	CHM 314L	1
CME 200	0	CME 200	0-1
CME 203	3	CME 281	3
EGR 202	3	CMM 100 (Satisfies CAP Communication)	3
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3	MTH 219	3
MTH 218	4	PHY 207	3
	17		**16-17**

Third Year

Fall	Hours	Spring	Hours
CME 311	3	CME 306	3
CME 324	3	CME 325	3
CME 381	3	CME 326L	2
EGR 201	3	Advanced PHL Ethics (Satisfies CAP Crossing Boundaries and Practical Ethical Action)	3
SSC 200	3	CME 365	3
Art Study (Satisfies CAP Art Study)	3	EGR 203	3
	18		**17**

Fourth Year

Fall	Hours	Spring	Hours
Advanced REL (Satisfies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice)	3	Advanced HST (Satisfies CAP Crossing Boundaries)	3
CME 466L	2	CME 453L	2
CME 430	3	CME 408	0
CME 452	3	CME 431	3

CME 408	0-1	CME Elective	3
CHM/BIO Elective	3	TECH Elective	3
CME 465	3	CME Advanced Elective	3
	17-18		**17**

Total credit hours: 135-139

Courses

CME 101. Introduction to Chemical Engineering. 0-1 Hours
Introduction to the chemical engineering faculty, facilities, and curriculum; survey of career opportunities in chemical engineering. Introduction to the University first-year experience.

CME 198. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analysing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evalutating engineering solutions and engineering designs. Proposals from terams of students will be considered.

CME 200. Professional Development Seminar. 0-1 Hours
Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all sophomore students.

CME 203. Material & Energy Balances. 3 Hours
Introductory course on the application of mass and energy conservation laws to solve problems typically encountered in chemical process industries. Prerequisite(s): CHM 123; MTH 168. Corequisite(s): EGR 202.

CME 211. Introduction to Thermodynamics for Chemical Engineers. 3 Hours
First law of thermodynamics, states of matter, equations of state, open and closed system energy balances, reactive energy balances, entropy, 2nd law of thermodynamics, introduction to power cycles and refrigeration. Prerequisite(s): PHY 206, CHM 123, MTH 168.

CME 281. Chemical Engineering Computations. 3 Hours
Development of computational skills with an emphasis on algorithm development and problem solving. Computational skills are applied to typical problems in chemical engineering, engineering data analysis and statistics. Corequisite(s): CME 203.

CME 298. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CME 306. Chemical Reaction Kinetics & Engineering. 3 Hours
Chemical reaction kinetics, ideal reactor analysis and design, multiple reactor/reaction systems, and heterogeneous catalysis. Prerequisite(s): CME 311.

CME 311. Chemical Engineering Thermodynamics. 3 Hours
Development and application of the fundamental principles of chemical thermodynamics: Vapor/liquid equilibrium, solution thermodynamics, chemical reaction equilibria, and thermodynamic analysis of chemical engineering processes. Prerequisite(s): CME 203; EGR 202; MTH 218.

CME 324. Transport Phenomena I. 3 Hours
Viscosity, shell momentum balances, isothermal equations of change, thermal conductivity, shell energy balances, non-isothermal equations of change, mass diffusivity, shell species mass balances, equations of change for multicomponent systems. Prerequisite(s): CME 203, CME 281; MTH 219. Corequisite(s): CME 381.

CME 325. Transport Phenomena II. 3 Hours
Multidimensional momentum, energy, and mass transport, dimensionless parameters, turbulence and numerical solution methods. Prerequisite(s): CME 324, CME 381.

CME 326L. Transport Phenomena Laboratory. 1-2 Hours
Viscosity, conductivity, diffusion coefficient measurements, velocity, temperature, concentration profiles, engineering instrumentation, and experimental error analysis. Prerequisite(s): CME 324. Corequisite(s): CME 325.

CME 365. Separation Techniques. 3 Hours
Equilibrium staged separations: distillation, extraction and absorption, with an emphasis on distillation. Prerequisite(s): CME 311, CME 324.

CME 381. Advances Mathematics for Chemical Engineers. 3 Hours
Study of analytical and numerical techniques to support upper-level chemical engineering classes. Vector analysis, matrices, differential equations, numerical integration and differentiation, root finding, and curve fitting ordinary and partial differential equations. Prerequisite(s): CME 281; MTH 219.

CME 398. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CME 408. Seminar. 0-1 Hours
Presentation of lectures on contemporary chemical engineering subjects by students, faculty, and engineers in active practice. Registration required of senior students only.

CME 409. Introduction to Polymer Science - Thermoplastics. 3 Hours
Broad technical overview of the nature of synthetic macromolecules, including the formation of polymers and their structure, structure-property relationships, polymer characterization and processing, and applications of polymers. Fundmental topics such as viscoelasticity, the glassy state, time-temperature superposition, polymer transitions, and free volume will also be reviewed. The course focuses on thermoplastic polymers. Prerequisite(s): CHM 313, PHY 206, MTH 219.

CME 410. High Performance Thermoset Polymers. 3 Hours
Survey of high performance thermoset resins, focusing on chemistry, processing and properties of six general resin families; vinyl ester, epoxy, phenolic, cyanate ester, bismaleimide, and polyimides. The course will include fundamental discussions of polymerization mechanisms, network structure development, rheology and time-temperature transformation, resin toughening, and structure-processing-property relationships. Characterization techniques will also be reviewed. Prerequisite(s): CHM 313.

CME 412. Advanced Composites. 3 Hours
Materials and processing. Comprehensive introduction to advanced fiber reinforced polymeric matrix composites. Constituent materials and composite processing will be emphasized with special emphasis placed on structure-property relationships, the role of matrix in composite processing, mechanical behavior, and laminate processing. Specific topics will include starting materials, material forms, processing, quality assurance, test, methods, and mechanical behavior. Prerequisite(s): (CME 409 or CME 509 or MAT 501) or permission of instructor.

CME 429. Computational Chemistry. 3 Hours
Introduction to computational chemistry including a discussion of ab initio, semiempical, and DFT methods and an overview of molecular mechanics and molecular simulation methods. Lectures are supplemented by simulation exercises using commercial programs such a Gaussian and Molecular Studio. Prerequisite(s):CHM 124 or permission of instructor.

CME 430. Chemical Engineering Design I. 3 Hours
Study of basic design concepts, safety and health issues, capital cost estimation, manufacturing cost estimation, basic economics and profitability analysis, materials of construction, materials selection and process vessel design. Prerequisite(s): CME 203.

CME 431. Chemical Engineering Design II. 3 Hours
Project-based study of principles of process design and economics, use of process flowsheet simulators, short-cut design procedures, process optimization, and plant layout. Prerequisite(s): CME 306, CME 365, CME 430, CME 465.

CME 432. Chemical Product Design. 3 Hours
Application of the design process to products based on chemical technology. Coverage of the entire design process from initial identification of product needs, to the generation and selection of product ideas, and culminating in the manufacture of a new product.

CME 452. Process Control. 3 Hours
Mathematical models, Laplace transform techniques, and process dynamics. Feedback control systems, hardware, and instrumentation. Introduction to frequency response, advanced techniques, and digital control systems. Prerequisite(s): CME 381.

CME 453L. Process Control Laboratory. 2 Hours
Team-based, project oriented study of process dynamics and digital control using computer-based data acquisition and control systems with a focus on real time process monitoring and control. Prerequisite(s): (CME 452, CME 466L) or permission of instructor.

CME 465. Fluid Flow & Heat Transfer Processes. 3 Hours
Fluid mechanics, transportation and metering of fluids, heat transfer and its applications. Prerequisite(s): CME 311, CME 324.

CME 466L. Chemical Engineering Unit Operations Laboratory. 2 Hours
Study of the equipment and utilization of various chemical engineering processes. Team based experimentation includes designing, and performing experiments on common chemical process unit operations apparatuses. After experimentation, students analyze data and compare with literature for experiment validation. Report writing and group presentations are emphasized. Prerequisite(s): CME 365. Corequisite(s): CME 465.

CME 486. Introduction to Petroleum Engineering. 3 Hours
Introduction to the fundamental concepts in petroleum engineering. Petroleum topics include overviews of areas such as petroleum geology, petroleum fluids and thermodynamics, drilling and completion, and production and multiphase flow. In addition this course will cover refinery operations.

CME 489. Principles of Biology for Bioengineers. 3 Hours
This course is designed for students with undergraduate majors in engineering or non-biological sciences. The focus of the course is to provide a common broad base of basic knowledge and terminology in the biological sciences required for coursework in the bioengineering emphasis tracts. Prerequisite(s): (BIO 151, BIO 152) or permission of instructor.

CME 490. Introduction to Bioengineering. 3 Hours
This class provides an introduction to bioengineering - a branch of engineering focusing on biological systems, biomaterials, engineering applications in living systems, and many other areas. By the end of this course, students will be able to understand bioengineering applications and processes, and properly apply engineering fundamentals, including transport phenomena and reaction kinetics, to these systems. Prerequisite(s): (BIO 151, CME 324 or BIE 505) or permission of instructor.

CME 491. Biomedical Engineering I. 3 Hours
Introduction to the fundamental concepts in biomedical engineering with a special focus on chemical engineering applications. Biomedical topics include overviews of areas such as biomaterials, tissue engineering, biosensors and biomedical engineering technology. Prerequisite(s): (BIO 151; (CHM 420 or CHM 451); CME 324, CME 365) or permission of instructor.

CME 492. Chemical Sensors & Biosensors. 3 Hours
Analysis performed with chemical sensors complement laboratory analyses and offer the potential for more rapid and on-line analyses in complex sample matrices. The demand for new chemical sensors, biosensors, and sensing concepts is rapidly increasing and associated with the growing need to understand and/or control complex chemical and biochemical processes or detect the presence of toxic chemical or biological agents. Prerequisite(s): Permission of instructor.

CME 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

CME 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): CME 493.

CME 498. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CME 499. Special Problems in Chemical Engineering. 1-6 Hours
Particular assignments to be arranged and approved by chairperson of the department.

Civil and Environmental Engineering and Engineering Mechanics

Major:

- Bachelor of Civil Engineering

Minors:

- Engineering Mechanics
- Environmental Engineering
- Structures
- Transportation Engineering
- Water Resources Engineering

The Department of Civil and Environmental Engineering and Engineering Mechanics offers a broad-based curriculum leading to a Bachelor of Civil Engineering (BCE) degree. The BCE program offers sufficient elective courses to obtain a concentration in construction, environmental, structural, water resources, geotechnical, or transportation engineering.

The mission of the program is to graduate broadly educated, technically competent individuals prepared for professional careers or for advanced studies.

Within the first several years following completion of the program, University of Dayton Bachelor of Civil Engineering graduates are prepared to meet the following program educational objectives:

- have successful careers in civil engineering or other professions
- pursue advanced degrees in support of their chosen profession
- conduct professional and personal endeavors in a responsible and ethical manner
- seek service and leadership roles in their profession and community
- continue their professional and personal growth through a process of life-long learning.

Civil engineering is the profession in which knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to economically utilize the materials and forces of nature in improving and protecting the environment and providing structures and facilities for community, industry, and transportation for the progressive well-being of humanity.

Civil engineers, leading users of high technology in wide-ranging applications in both the public and the private sectors, are essential to the continued improvement of society. Civil engineers can enter traditional fields such as construction, bridge and building design and analysis, highway design and traffic control, water treatment and distribution, environmental engineering, water resources, and geotechnics. Their broad education however, also prepares them for materials engineering, engineering management, and the aerospace, power, and automotive industries. Civil engineering has applications in conceptual and detail design, field operations, computers, and consulting.

Members of the student chapters of the American Society of Civil Engineers (ASCE), Chi Epsilon, Institute of Transportation Engineers (ITE), and National Society of Professional Engineers (NSPE) have the opportunity to meet regularly with practicing engineers in the Dayton community.

Faculty

Donald V. Chase, Chairperson

Professors Emeriti: Bogner, J. Whitney
Professor: J. Saliba
Associate Professors: Bilgin, Crosson, Donaldson, Eustace, D. Taylor
Assistant Professors: Toubia, T. Whitney
Lecturer: Alakkad
Visiting Professor: Chase

Bachelor of Civil Engineering (CEE) minimum 138 hours

Common Academic Program (CAP)		
*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements		
CEE 101	Introduction to Civil Engineering (2 semesters)	0
CEE 200	Professional Development Seminar (2 semesters)	0
CEE 213	Surveying	2
CEE 214	Highway Geometrics	2
CEE 215L	Surveying Field Practice	3
CEE 221L	Civil Computation Laboratory	2
CEE 300	Professional Development Seminar (2 semesters)	0
CEE 311 & 311L	Civil Engineering Materials and Civil Engineering Materials Laboratory	3

CEE 312 & 312L	Geotechnical Engineering and Geotechnical Engineering Laboratory	4
CEE 313 & 313L	Hydraulics and Hydraulics Laboratory	4
CEE 316	Analysis of Structures I	3
CEE 333	Water Resources Engineering	3
CEE 400	Professional Development Seminar (2 semesters)	0
CEE 403	Transportation Engineering	3
CEE 411	Design of Steel Structures	3
CEE 412	Design of Concrete Structures	3
CEE 425	Civil Engineering Systems	3
CEE 434 & 434L	Water & Wastewater Engineering and Water & Wastewater Engineering Laboratory	4
CEE 450	Civil Engineering Design [1]	3
CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CHM 124	General Chemistry	3
CMM 100	Principles of Oral Communication	3
EGM 202	Dynamics	3
EGM 303	Mechanics II	3
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
EGR 201	Engineering Mechanics	3
EGR 202	Engineering Thermodynamics	3
EGR 203	Electrical & Electronic Circuits	3
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	6
or ENG 200H	Writing Seminar II	
GEO 218	Geological Site Investigation for Engineers	3
HST 103	The West & the World	3
or HST 198	History Scholars' Seminar	
HST 343	History of Civil Engineering	3
MTH 168	Analytic Geometry & Calculus I	4
MTH 169	Analytic Geometry & Calculus II	4
MTH 218	Analytic Geometry & Calculus III	4
MTH 219	Applied Differential Equations	3
PHL 103	Introduction to Philosophy	3
PHY 206	General Physics I - Mechanics	3
PHY 207	General Physics II - Electricity & Magnetism	3
REL 103	Introduction to Religious and Theological Studies	3
CEE electives [3,4]		9
Electives		12
Tech elective		3
Total Hours		138

1. Admittance into CEE 450 requires successful completion of all required engineering courses with an average academic unit GPA of no less than 2.0, or approval of the chair.
2. Three semester hours waived if accepted into ENG 200H.
3. Select from list approved by the Department of Civil and Environmental Engineering and Engineering Mechanics.
4. May be used to concentrate studies in the areas of construction, environmental, structural, geotechnical, transportation, and water resources engineering.

Minor in Engineering Mechanics (EME)

This minor is open to all engineering majors. The program provides a broad treatment of engineering mechanics including theoretical, numerical, and experimental topics.

Select four courses from: [1]		12
CEE 540	Composites Design	
or EGM 540	Composite Design	
EGM 303	Mechanics II	
EGM 503	Introduction to Continuum Mechanics	
EGM 511	Experimental Stress Analysis	
EGM 533	Theory of Elasticity	
EGM 546	Finite Element Analysis I	
MAT 540	Composite Design	
MEE 504	Fundamentals of Fluid Mechanics	
Total Hours		12

1. Courses selected may not be those already required for student's major.

Minor in Environmental Engineering (EVE)

This minor is open to all non-civil engineering majors. The program defines contemporary problems of pollution and identifies the technological approaches necessary to preserve the quality of our environment.

Select four courses from: [1]		12
CEE 390	Environmental Pollution Control [2]	
CEE 434	Water & Wastewater Engineering [3]	
CEE 499	Special Problems in Civil Engineering [4]	
or CME 499	Special Problems in Chemical Engineering	
CEE 560	Biological Processes in Wastewater Engineering	
CEE 562	Physical & Chemical Water & Wastewater Treatment Processes	
CEE 563	Hazardous Waste Engineering	
or CME 563	Hazardous Waste Engineering	
CEE 564	Solid Waste Engineering	
CEE 574	Fundamentals of Air Pollution Engineering I	
CEE 575	Fundamentals of Air Pollution Engineering II	
or CME 575	Fundamentals of Air Pollution Engineering II	
CEE 576	Environmental Engineering Separation Processes	
CHM 341	Environmental Chemistry	
EGR 330	Engineering Design & Appropriate Technology [4]	
Total Hours		12

1. Courses selected may not be those already required for student's major. It is recommended the minor include one course pertaining to water, air, and solid pollution control.
2. Not permissible for CME students.
3. Or CEE 595 Special Problems in Civil Engineering.

4 No more than three credit hours of EGR 330, CEE 499, or other special project coursework may be applied to this minor. Subject to approval of the CEE chairperson within two weeks of the start of the semester.

Minor in Structures (STR)

This minor is open to all non-civil engineering majors. The program provides a broad coverage of general concepts of structural design as applied to buildings, mechanical systems, and machinery.

Select four courses from:		12
CEE 311 & 311L	Civil Engineering Materials and Civil Engineering Materials Laboratory	
CEE 316	Analysis of Structures I	
CEE 411	Design of Steel Structures	
CEE 412	Design of Concrete Structures	
CEE 500	Adv Struct Analysis	
CEE 501	Struct. Analysis by Computer	
CEE 502	Prestressed Concrete	
CEE 504	Structural Dynamics	
CEE 505	Plastic Design in Steel	
CEE 507	Masonry Design	
CEE 508	Design Timber Struc	
CEE 524	Foundation Engr	
CEE 540	Composites Design	
Total Hours		12

Minor in Transportation Engineering (TRE)

This minor is open to all non-civil engineering majors. The program provides broad coverage in the planning, design, operations, and management of the transportation system.

Select four courses from: [1]		12
CEE 403	Transportation Engineering	
CEE 515	Pavement Engineering	
CEE 550	Hghwy Geometrc Desgn	
CEE 551	Traffic Engineering	
CEE 552	Intelligent Transportation Sys	
CEE 553	Travel Demand Mdlng	
CEE 554	Urban Public Trnsprtn	
CEE 555	Hgwy Traffic Safety	
CEE 558	Traffic Engr Rsrch	
CEE 595	Special Problems in Civil Engineering	
Total Hours		12

1 Courses selected may not be those already required for student's major.

Minor in Water Resources Engineering (WRE)

This minor is open to all non-civil engineering majors. The program provides broad coverage to the general concepts used in water resources engineering including hydraulics and hydrology issues within economic, optimization, operation, and management frameworks.

Select four courses from: [1]		12
CEE 313	Hydraulics	
CEE 333	Water Resources Engineering	
CEE 580	Hydrology & Seepage	
CEE 582	Adv Hydraulics	
CEE 584	Open Channel Flow	
CEE 595	Special Problems in Civil Engineering	
Total Hours		12

1 Courses selected may not be those already required for student's major.

First Year

Fall	Hours	Spring	Hours
EGR 100	0	EGR 100	0
HST 103 (Satisfies CAP First-Year Humanities Common)	3	CMM 100	3
PHY 206 (Satisfies CAP Natural Science)	3	EGR 201	3
MTH 168 (Satisfies CAP Math Requirement)	4	MTH 169	4
PHL 103 (Satisfies CAP First-Year Humanities Common)	3	REL 103 (Satisfies CAP First Year Humanities Common)	3
CEE 101	0	CEE 101	0
EGR 103	2	CHM 123 (Satisfies CAP Natural Science)	3
ENG 100 (Satisfies CAP Writing Seminar)	3	CHM 123L (Satisfies CAP Natural Science)	1
	18		**17**

Second Year

Fall	Hours	Spring	Hours
CEE 221L	2	GEO 218 (Satisfies CAP Crossing Boundaries & Inquiry)	3
PHY 207	3	EGM 303	3
EGM 202	3	EGR 202	3
MTH 218	4	MTH 219	3
CEE 213	2	CEE 214	2
CEE 200	0	CEE 200	0
CHM 124	3	ENG 200 (Satisfies CAP Second Year Writing Seminar)	3
		CEE 215L (SUMMER)	3
	17		**20**

Third Year

Fall	Hours	Spring	Hours
CEE 300	0	CEE 300	0
CEE 313 & 313L	4	CEE 311 & 311L	3
CEE 316	3	CEE 312 & 312L	4
CEE 403	3	CEE 333	3

EGR 203	3	CEE 411	3
Advanced PHL Ethics (Satisfies CAP Crossing Boundaries and Practical Ethical Action)	3	CEE 425	3
	16		**16**
Fourth Year			
Fall	**Hours**	**Spring**	**Hours**
CEE 400	0	CEE 400	0
CEE 412	3	CEE 450 (Satisfies CAP Capstone Requirement)	3
CEE 434 & 434L	4	SSC 200	3
CEE Elective	3	CEE/TECH Elective	3
CEE Elective	3	CEE Elective	3
Advanced REL (Satisfies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice)	3	HST 343 (Satisfies CAP Crossing Boundaries, Advanced History)	3
		Art Study (Satisifies CAP Art Study)	3
	16		**18**

Total credit hours: 138

Civil Environmental Engr Courses

CEE 101. Introduction to Civil Engineering. 0-1 Hours
Introduction to the civil engineering faculty, facilities, and curriculum; to the career opportunities offered by the civil engineering profession; and to the areas of specialization within civil engineering.

CEE 198. Research & Innovation Laboratory. 1,6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CEE 200. Professional Development Seminar. 0 Hours
Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all sophomore students.

CEE 213. Surveying. 2 Hours
Theory of measurements, computation, and instrumentation. Boundary and construction surveys, triangulation, and level net adjustments. First term, each year. Corequisite(s): MTH 168.

CEE 214. Highway Geometrics. 2 Hours
Study of circular and spiral curves, vertical curves, grade lines, earthwork and mass diagram, slope and grade stakes, and contour grading. Second term, each year. Prerequisite(s): CEE 213.

CEE 215L. Surveying Field Practice. 3 Hours
Field work and computation in topography, highway surveying, triangulation, level net, evaluation of errors, and preparation of plans. Five eight-hour days a week for three weeks. Summer, each year. Prerequisite(s): CEE 214.

CEE 221L. Civil Computation Laboratory. 2 Hours
Introduction to numerical methods and logical problem solving techniques commonly used in the civil engineering profession. Introduction to computer aided drawing and design and the use of popular CADD packages in the civil engineering profession.

CEE 298. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CEE 300. Professional Development Seminar. 0 Hours
Practice in the presentation and discussion of papers; lectures by staff and prominent engineers. Attendance required of all civil engineering juniors.

CEE 311. Civil Engineering Materials. 2 Hours
Physical and mechanical properties of construction materials; Portland cement concrete, bituminous materials, wood, ferrous and non-ferrous metals, masonry units; proportioning of concrete mixtures including admixtures. Prerequisite(s): EGM 303. Corequisite(s): CEE 311L.

CEE 311L. Civil Engineering Materials Laboratory. 1 Hour
Laboratory experiments in the physical and mechanical properties of construction materials; Portland cement concrete, bituminous materials, wood, ferrous and non-ferrous metals, and masonry units; proportioning of concrete mixtures including admixtures. Corequisite(s): CEE 311.

CEE 312. Geotechnical Engineering. 3 Hours
Principles of soil structures, classification, capillarity, permeability, flow nets, shear strength, consolidation, stress analysis, slope stability, lateral pressure, bearing capacity, and piles. Second term, each year. Prerequisite(s): CEE 313; EGM 303. Corequisite(s): CEE 312L; GEO 218.

CEE 312L. Geotechnical Engineering Laboratory. 1 Hour
Laboratory tests to evaluate and identify soil properties for engineering purposes. Design problems are also included. Second term, each year. Corequisite(s): CEE 312.

CEE 313. Hydraulics. 3 Hours
Basic principles of fluid mechanics in closed conduits and open channels. Principles include fluid statics, conservation of mass, conservation of momentum, conservation of energy, and fluid dynamics. Presentation of fluid mechanics principles through the solution of practical problems and a comprehensive semester project. Prerequisite(s): EGM 202. Corequisite(s): CEE 313L.

CEE 313L. Hydraulics Laboratory. 1 Hour
Laboratory experiments and problems associated with CEE 313. Corequisite(s): CEE 313.

CEE 316. Analysis of Structures I. 3 Hours
Elastic analysis of structures; deflection, moment-area theorems; conjugate-beam; virtual work influence lines; analysis of indeterminate structures using force methods; theories of failure, stiffness matrices, and use of software to analyze structures. Prerequisite(s): EGM 303.

CEE 317. Analysis of Structures II. 3 Hours
Elastic analysis of structures; virtual work; Castigliano's theorems; slope deflection and moment distribution; computer analysis of structural systems, influence lines, column analogy, limit analysis. Departmental elective. Prerequisite(s): CEE 316.

CEE 333. Water Resources Engineering. 3 Hours
Integrated study of the principles of water movement and management. Focus areas include hydrology, water distribution, storm water management, and waste water collection. Second semester, each year. Prerequisite(s): CEE 313.

CEE 390. Environmental Pollution Control. 3 Hours
Study of environmental pollution problems relating to air, water, and land resources. Causes and effects of pollution technology for solving problems. Legal and political considerations. For juniors and seniors other than civil engineering students. Credit may not be applied toward civil engineering degree. Prerequisite(s): Some knowledge of chemistry.

CEE 398. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CEE 400. Professional Development Seminar. 0 Hours
Practice in the presentation and discussion of papers; lectures by staff and prominent engineers. Attendance required of all civil engineering seniors.

CEE 403. Transportation Engineering. 3 Hours
Fundamentals of transportation engineering, including design, construction, maintenance, and economics of transportation facilities. Design of pavement structures and drainage systems. Prerequisite(s): CEE 214.

CEE 411. Design of Steel Structures. 3 Hours
Design and behavior of structural steel connections, columns, beams, and beams subjected to tension, compression, bending, shear, torsion, and composite action. Second semester, each year. Prerequisite(s): CEE 316.

CEE 412. Design of Concrete Structures. 3 Hours
Design and behavior of reinforced concrete slabs, beams, columns, walls, and footings subjected to tension, compression, bending, shear, and torsion. First semester, each year. Prerequisite(s): CEE 311, CEE 316.

CEE 421. Construction Engineering. 3 Hours
Organization, planning, and control of construction projects, including a study of the use of machinery, economics of equipment, methods, materials, estimates, cost controls, and fundamentals of CPM and PERT contracts and bonds and legal aspects of contracting. Departmental elective.

CEE 422. Design & Construction Project Management. 3 Hours
Fundamentals of project management as they relate to the design and construction professional, and the application of project management techniques to the design and construction of major projects. Departmental elective.

CEE 425. Civil Engineering Systems. 3 Hours
Analysis and evaluation of civil engineering systems using operations research tools including systems modeling, optimization and probability, and statistics. Civil engineering systems will also be examined from an economic perspective. Prerequisite(s): Junior or senior status.

CEE 434. Water & Wastewater Engineering. 3 Hours
Problems of water pollution; development and design of public water supply and waste water treatment systems; legal, political, ethical, and moral considerations. First term, each year. Prerequisite(s): CHM 124. Corequisite(s): CEE 313, CEE 434L.

CEE 434L. Water & Wastewater Engineering Laboratory. 1 Hour
Laboratory exercises, demonstrations, and design problems associated with water and wastewater engineering. First semester, each year. Prerequisite(s): CHM123L. Corequisite(s): CEE 434.

CEE 450. Civil Engineering Design. 3 Hours
A group design of a complete, large-scale civil engineering system. The capstone design experience draws upon knowledge acquired over a wide spectrum of civil engineering subjects including environmental, geotechnical, structural, transportation and water resources engineering as well as project management. Second semester, each year. Prerequisite(s): CEE 312, CEE 333, CEE 403, CEE 411, CEE 412, CEE 434.

CEE 463. Hazardous Waste Treatment. 3 Hours
The fundamental principles of the design and operation of hazardous waste control and hazardous substances remediation processes. Hazardous waste regulations, risk assessment, and management. Department Elective. Prerequisite(s): CHM 124.

CEE 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

CEE 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): CEE 493.

CEE 498. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

CEE 499. Special Problems in Civil Engineering. 1-6 Hours
Particular assignments to be arranged and approved by chairperson of the department. Departmental elective.

Engineering Mechanics Courses

EGM 202. Dynamics. 3 Hours
Kinematics, including translation, rotation, plane motion, and relative motion; kinetics of particles and bodies by the methods of force-mass-acceleration, work-energy, and impulse-momentum. Each semester, each year. Prerequisite(s): EGR 201.

EGM 303. Mechanics II. 3 Hours
The study of stresses, strains, and deflections in tension, compression, shear, flexure, and torsion; shear and moment diagrams; analysis of stresses and strains at a point; Mohr's circle; analysis of columns. Each semester, each year. Prerequisite(s): EGR 201.

EGM 304. Advanced Strength of Materials. 3 Hours
Stresses and strains at a point; shear center; unsymmetrical bending; curved beams; flat plates; torsion of noncircular bars; beams on elastic support; buckling; introduction to mechanics of composite materials. First and second terms each year. Prerequisite(s): EGM 303.

EGM 499. Special Problems in Engineering Mechanics. 1-6 Hours
Particular assignments to be arranged and approved by chairperson of the department.

Electrical and Computer Engineering

Majors:

- Bachelor of Electrical Engineering
- Bachelor of Science in Computer Engineering

Concentrations:

- Electrical Energy Systems
- Electro-Optics
- Robotics

Minors:

- Computer Systems
- Signals and Systems

The Department of Electrical and Computer Engineering offers two ABET accredited undergraduate programs leading to the Bachelor of Electrical Engineering and the Bachelor of Science in Computer Engineering. The department offers masters and doctoral degrees in electrical and computer engineering and is closely coupled to the graduate program in electro-optics where both master's and doctoral degrees are offered. The electrical and computer engineering department offers an accelerated 5 year B.S.-M.S. program, where students completing their baccalaureate degree can attain their Master of Science in Electrical Engineering or Computer Engineering within one additional year. The department also offers an undergraduate concentration in electro-optics, in collaboration with the Physics Department and the Electro-Optics Program, as well as a concentration in Robotics, and a concentration in Electrical Energy Systems.

The mission of the Department of Electrical and Computer Engineering is to develop in students the skills and knowledge to learn, lead, and serve in their profession and their community.

Our electrical engineering and computer engineering graduates will be prepared to:

1. find rewarding careers as engineering professionals. As electrical engineers they will be prepared to design and develop new products, technologies, and processes that incorporate one or more of the following elements: analog and digital circuits, signals and systems, propagation and processing of signals, and control systems. As computer engineers they will be prepared to design and develop new products, technologies, and processes that incorporate one or more of the following elements: analog and digital circuits, signals and systems, computer design, software development, and hardware/software integration.
2. continue their professional education either formally, in graduate school, professional schools, or through industrial training programs; or informally, through activities such as continuing education, attendance in short courses, professional workshops, and conferences.
3. exercise and further develop their skills in professional communication through activities such as project briefings, conference presentations, technical reports and manuals, and journal publications.
4. participate in activities for the betterment of society, and carry on the traditions of the University of Dayton by maintaining high ethical standards in their professional activities, and by serving their country and community through service, leadership and mentoring.

Electrical engineering is an exciting field within the engineering discipline. It offers the opportunity to enter some of the most rewarding and challenging careers available. The explosion of capabilities in the computer, communication, automotive, medical, entertainment, and aerospace industries, as well as homeland security has resulted from advances in the electronics field. Electrical engineers are equipped to enter this dynamic arena as well as equally challenging and rewarding careers in the fields of electro-optics, communication, radar, signal and image processing, biomedicine, controls, robotics and instrumentation, and many more. Electrical engineers work in all phases of technological programs. They are involved from the conception of the basic ideas through design, fabrication, verification, manufacturing, and marketing of the final product.

Computer engineering represents perhaps the most sought-after professional component of an engineering team which develops the technological possibilities inherent in the design, construction, and operation of computer systems. The computer engineer performs a wide variety of tasks involving hardware, software, peripherals, computer-controlled systems, and hardware-software integration, as well as computer applications in the multitude of areas listed above.

Both electrical engineering and computer engineering are broad-based engineering disciplines that provide for a wide range of career choices within the engineering field as well as providing an excellent basis for careers in such diverse areas as business, law, and medicine.

The electrical engineering curriculum is designed to provide an understanding of basic electrical engineering principles with emphasis on the development of problem solving skills. The computer engineering curriculum draws from software courses taken in computer science and hardware related courses taken from Electrical and Computer Engineering, culminating in the integration of hardware and software in systems design. An extensive laboratory experience is integrated with the classroom work to assure that the student develops a working knowledge of the fundamentals. Upper level courses integrate the knowledge base with current technology and computational tools resulting in a graduate capable of making a contribution to the engineering profession by either entering the work force or pursuing a graduate education.

Faculty

Guru Subramanyam, Chairperson
Professors Emeriti: Evers, Kee, Loomis, Moon, Rogers, Scarpino, Thiele, Williamson
Professors: Asari, Banerjee, Chatterjee, Duncan, Hardie, Haus, Ordonez, Penno, Sarangan, Subramanyam, Vorontsov, Weber,Wicks, Zhan
Associate Professors: Balster, Daniels, Taha
Assistant Professor: Hirakawa
Adjunct Professors: Barrera, Bogle, Coutu, Duchen, Grote, Kebede, Kessler, Kim, Kladitis, Kumar, LaMonte, Malas, Patterson, Shin, Wang, Wang, Yakopcic, Zhang

Bachelor of Electrical Engineering (ELE) minimum 134 hours

Common Academic Program (CAP)

*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123	General Chemistry	3
CMM 100	Principles of Oral Communication	3
CPS 150	Algorithms & Programming I	4
ECE 101	Introduction to Electrical & Computer Engineering II (2 semesters)	0
ECE 200	Professional Development Seminar (2 semesters)	0
ECE 201L	Circuit Analysis Laboratory	1
ECE 203	Introduction to MATLAB Programming	1
ECE 204 & 204L	Electronic Devices and Electronic Devices Laboratory	4
ECE 215 & 215L	Introduction to Digital Systems and Digital Systems Laboratory	4
ECE 303 & 303L	Signals & Systems and Signals & Systems Laboratory	4
ECE 304 & 304L	Electronic Systems and Electronic Systems Laboratory	4
ECE 314 & 314L	Fundamentals of Computer Architecture and Fundamentals of Computer Architecture Laboratory	4
ECE 332	Electromagnetics	3
ECE 333	Applied Electromagnetics	3
ECE 334	Discrete Signals & Systems	3
ECE 340	Engineering Probability & Random Processes	3
ECE 401 & 401L	Communication Systems and Communication Systems Laboratory	4
ECE 415	Control Systems	3
ECE 431L	Multidisciplinary Engineering Design Laboratory I	2
ECE 432L	Multidisciplinary Design II	3
ECE 433	Project Management & Innovation	1
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
EGR 201	Engineering Mechanics	3
EGR 202	Engineering Thermodynamics	3
EGR 203	Electrical & Electronic Circuits	3
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	6
or ENG 200H	Writing Seminar II	
HST 103	West and the World	3
or HST 198	History Scholars' Seminar	
MTH 168	Analytic Geometry & Calculus I	4
MTH 169	Analytic Geometry & Calculus II	4
MTH 218	Analytic Geometry & Calculus III	4
MTH 219	Applied Differential Equations	3
MTH 310	Linear Algebra & Matrices	3
PHL 103	Intro To Philosophy	3
PHL 316	Engineering Ethics	3
or PHL 319	Information Ethics	
PHY 206	General Physics I - Mechanics	3
PHY 210L	General Physics Laboratory I	1
PHY 232	The Physics of Waves	3
REL 103	Introduction to Religious and Theological Studies	3
Electives		12
Technical electives [1]		12
Total Hours		134

1 Select from list approved by the Department of Electrical and Computer Engineering.

Bachelor of Science in Computer Engineering (CPE) minimum 137 hours

Common Academic Program (CAP)

*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	

Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123	General Chemistry	3
CMM 100	Principles of Oral Communication	3
CPS 150	Algorithms & Programming I	4
CPS 151	Algorithms & Programming II	4
CPS 346	Operating Systems I	3
CPS 350	Data Structures & Algorithms	3
CPS 444	UNIX/Linux Programming	3
ECE 101	Introduction to Electrical & Computer Engineering II (2 semesters)	0
ECE 200	Professional Development Seminar (2 semesters)	0
ECE 201L	Circuit Analysis Laboratory	1
ECE 203	Introduction to MATLAB Programming	1
ECE 204 & 204L	Electronic Devices and Electronic Devices Laboratory	4
ECE 215 & 215L	Introduction to Digital Systems and Digital Systems Laboratory	4
ECE 303 & 303L	Signals & Systems and Signals & Systems Laboratory	4
ECE 304 & 304L	Electronic Systems and Electronic Systems Laboratory	4
ECE 314 & 314L	Fundamentals of Computer Architecture and Fundamentals of Computer Architecture Laboratory	4
ECE 334	Discrete Signals & Systems	3
ECE 340	Engineering Probability & Random Processes	3
ECE 431L	Multidisciplinary Engineering Design Laboratory I	2
ECE 432L	Multidisciplinary Design II	3
ECE 433	Project Management & Innovation	1
ECE 444	Advanced Digital Design	3
ECE 449	Computer Systems Engineering	3
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
EGR 201	Engineering Mechanics	3
EGR 202	Engineering Thermodynamics	3
EGR 203	Electrical & Electronic Circuits	3
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	6
or ENG 200H	Writing Seminar II	
HST 103	West and the World	3
or HST 198	History Scholars' Seminar	
MTH 168	Analytic Geometry & Calculus I	4
MTH 169	Analytic Geometry & Calculus II	4
MTH 218	Analytic Geometry & Calculus III	4
MTH 219	Applied Differential Equations	3
MTH 310	Linear Algebra & Matrices	3
PHL 103	Intro To Philosophy	3
PHL 319	Information Ethics	3
PHY 206	General Physics I - Mechanics	3
PHY 210L	General Physics Laboratory I	1
PHY 232	The Physics of Waves	3
REL 103	Introduction to Religious and Theological Studies	3
Computer Science elective		3
Electives		12
Technical electives [1]		6
Total Hours		137

1 Select from list approved by the Department of Electrical and Computer Engineering.

Concentration in Electrical Energy Systems (ENS)

The Electrical Energy Systems Concentration will prepare our Electrical and Computer Engineering students in all aspects of Electrical Energy Systems including generation, transmission, distribution, utilization, and storage, as well as enabling technologies for the smart grid.

Required ECE courses:

ECE 316	Introduction to Electrical Energy Systems	3
or ECE 499	Special Problems in Electrical & Computer Engineering	
ECE 414	Electromechanical Devices	3
ECE 471	Contemporary Power Systems & the Smart Grid	3
Select one course from:		3
ECE 472	Smart Grid Technologies	
MEE 473	Renewable Energy Systems	
Total Hours		12

Concentration in Electro-Optics (EOP)

The departments of Electrical and Computer Engineering and Physics, with the support of the Electro-Optics Graduate Program at University of Dayton, offers an undergraduate concentration in Electro-Optics. This multidisciplinary concentration is open to Electrical Engineering, Computer Engineering and Physics undergraduates with appropriate

prerequisite background. This concentration will enable students to pursue new coop opportunities and possible careers in photonics, and better prepare students to pursue new coop opportunities and possible careers in photonics and better prepare students who wish to pursue graduate degrees in the area of optics. All the courses listed below are approved as free technical electives for ECE undergraduate students.

ECE 443	Introduction to Electro-Optics	3
PHY 404	Physical Optics	3
Select two courses from:		6
EOP 501	Geometric Optics	
EOP 502	Optical Radiation & Matter	
EOP 505	Introduction to Lasers	
EOP 506/ ECE 573	Electro-Optical Devices & Systems	
EOP 513/ ECE 572	Linear Systems & Fourier Optics	
EOP 514/ ECE 574	Guided-Wave Optics	
Total Hours		12

Concentration in Robotics (ROB)

Robotics (CPE Majors)		15
ECE 415	Control Systems	3
ECE 416	Introduction to Industrial Robotic Manipulators	3
ECE 447	Digital Control Systems	3
Select one course from:		6
CPS 480	Artificial Intelligence	
ECE 414	Electromechanical Devices	
ECE 445	Signal Processing	
MEE 321	Theory of Machines	
MEE 434	Mechatronics	
MEE 438	Robotics & Flexible Manufacturing	
Robotics (ELE Majors)		12
ECE 416	Introduction to Industrial Robotic Manipulators	3
ECE 447	Digital Control Systems	3
Select two courses from:		6
CPS 480	Artificial Intelligence	
ECE 414	Electromechanical Devices	
ECE 445	Signal Processing	
MEE 321	Theory of Machines	
MEE 434	Mechatronics	
MEE 438	Robotics & Flexible Manufacturing	

Minor in Computer Systems (COS)

This minor is open to chemical, civil, and mechanical engineering majors, and other students with appropriate prerequisite background who receive permission from the ECE Department Chairperson. The program builds strength in the area of computer systems and digital design, with emphasis on computer hardware.

Computer Systems (non-MEE majors)		16
CPS 150	Algorithms & Programming I	4
or ECE 444	Advanced Digital Design	
ECE 201L	Circuit Analysis Laboratory	1
ECE 215 & 215L	Introduction to Digital Systems and Digital Systems Laboratory	4
ECE 314 & 314L	Fundamentals of Computer Architecture and Fundamentals of Computer Architecture Laboratory	4
EGR 203	Electrical & Electronic Circuits	3
Computer Systems (MEE majors)		15
CPS 150	Algorithms & Programming I (or equivalent)	4
ECE 215 & 215L	Introduction to Digital Systems and Digital Systems Laboratory	4
ECE 314 & 314L	Fundamentals of Computer Architecture and Fundamentals of Computer Architecture Laboratory	4
ECE 444	Advanced Digital Design	3

Minor in Signals and Systems (SAS)

This minor is open to chemical, civil, and mechanical engineering majors, and other students with appropriate prerequisite background who receive permission from the ECE Department Chairperson. The program provides the essential background in signals and systems theory including continuous and discrete systems. An advanced course is selected by the students to allow them to specialize in controls or signal processing.

ECE 201L	Circuit Analysis Laboratory	1
ECE 203	Introduction to MATLAB Programming	1
ECE 303 & 303L	Signals & Systems and Signals & Systems Laboratory	4
ECE 334	Discrete Signals & Systems	3
ECE 415	Control Systems	3
or ECE 445	Signal Processing	
ECE 201	Circuit Analysis	3
Total Hours		15

Electrical Engineering

First Year

Fall	Hours	Spring	Hours
ECE 100	0	ECE 101	0
PHY 206 (Satisfies CAP Natural Science)	3	CHM 123 (Satisfies CAP Natural Science)	3
MTH 168 (Satisfies CAP Math Requirement)	4	CPS 150	4
HST 103 (Satisfies CAP First Year Humanities Common)	3	EGR 100	0
PHL 103 (Satisfies CAP First Year Humanities Common)	3	MTH 169	4
ENG 100 (Satisfies CAP Writing Seminar)	3	CMM 100 (Satisfies CAP Communication)	3
EGR 100	0	REL 103 (Satisfies CAP First Year Humanities Common)	3
EGR 103	2		
Advanced HST (Satisfies CAP Crossing Boundaries)	3		
	21		**17**

Second Year

Fall	Hours	Spring	Hours
ECE 200	0	PHY 232 (Satisfies CAP Crossing Boundaries Inquiry)	3
PHY 210L	1	ECE 215	3
ECE 203	1	ECE 215L	1
EGR 201	3	MTH 219 (Satisfies CAP-CB Integratives)	3
MTH 218	4	ECE 204	3
ECE 201	3	ECE 204L	1
ECE 201L	1	EGR 202	3
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3		
	16		**17**

Third Year

Fall	Hours	Spring	Hours
ECE 300	0	ECE 333	3
ECE 332	3	ECE 340	3
ECE 314	3	ECE 334	3
ECE 314L	1	ECE 304	3
MTH 310 (Math Elective)	3	ECE 304L	1
ECE 303	3	SSC 200	3
ECE 303L	1		
Art Study (Satisfies CAP Art Study) and can also satisy CB FT or DB DSJ	3		
	17		**16**

Fourth Year

Fall	Hours	Spring	Hours
TECH Elective	3	TECH Elective	3
TECH Elective	3	TECH Elective	3
ECE 415	3	ECE 432L	3
ECE 431L	2	ECE 433	1
ECE 401	3	Advanced PHL Ethics (Satisfies CAP Crossing Boundaries and Practical Ethical Action)	3
ECE 401L	1		
Advanced REL (Satisifies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice)	3		
	18		**13**

Total credit hours: 135

Computer Engineering

First Year

Fall	Hours	Spring	Hours
ENG 100 (Satisfies CAP Writing Seminar)	3	CMM 100 (Satisfies CAP Communication)	3
ECE 100	0	CPS 150	4
HST 103 (Satisfies CAP First Year Humanities Common)	3	REL 103 (Satisfies CAP First Year Humanities Common)	3
PHL 103 (Satisfies CAP First Year Humanities Common)	3	ECE 101	0
MTH 168 (Satisfies CAP Math Requirement)	4	MTH 169	4
EGR 103	2	EGR 100	0
CHM 123	3	PHY 206	3
EGR 100	0	PHY 210L	1
	18		**18**

Second Year

Fall	Hours	Spring	Hours
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3	ECE 203	1
CPS 151	4	CPS 350	3
ECE 200	0	ECE 215	3
MTH 218	4	ECE 215L	1
ECE 201	3	MTH 219 (Satisfies CAP-CP Integrative)	3
ECE 201L	1	ECE 204	3
EGR 201	3	ECE 204L	1
		EGR 202	3
	18		**18**

Third Year

Fall	Hours	Spring	Hours
ECE 314	3	CPS 356	3
ECE 314L	1	ECE 340	3
ECE 303	3	ECE 334	3
CPS 341	3	ECE 304	3
PHY 207	3	ECE 304L	1
PHY 211L	1	Art Study (Satisfies CAP Art Study) and possibly CB: FT or DSJ	3
Advanced PHL Ethics (Satisfies CAP Crossing Boundaries and Practical Ethical Action)	3		
	17		**16**

Fourth Year

Fall	Hours	Spring	Hours
ECE 444	3	ECE 449	3
CPS 444	3	CPS Elect	3
TECH Elect	3	TECH Elect	3
ECE 431L	2	ECE 432L (Satisfies CAP Capatone Requirement)	3
SSC 200	3	Advanced REL (Satisfies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice)	3

ADV HST (Satisfies CAP Crossing Boundaries Advanced History Integrative)	3	
	17	**15**

Total credit hours: 137

Courses

ECE 100. Introduction to Electrical & Computer Engineering. 0 Hours
Introduction to electrical and computer engineering faculty, facilities, and curriculum. Career opportunities in electrical and computer engineering and areas of specialization are discussed.

ECE 101. Introduction to Electrical & Computer Engineering II. 0 Hours
Introduction to electrical and computer engineering faculty, facilities, and curriculum. Career opportunities in electrical and computer engineering and areas of specialization are discussed. Second semester seminar.

ECE 198. Multidisciplinary Research & Innovation Laboratory. 1-6 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis, and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

ECE 200. Professional Development Seminar. 0 Hours
Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all sophomore students.

ECE 201. Circuit Analysis. 3 Hours
Principles of linear circuit analysis and problem solving techniques associated with circuits containing both passive and active components. Includes analysis of linear circuits with direct current (DC) and alternating current (AC) excitation, as well as a study of transient behavior. Course includes an additional mandatory supervised weekly problem session. Prerequisite(s): MTH 168. Corequisite(s): ECE 201L.

ECE 201L. Circuit Analysis Laboratory. 1 Hour
Laboratory course stressing experimental techniques, laboratory reporting, safety, and instrumentation. Experimental investigation of linear circuit component behavior and the DC, AC, and transient response of linear circuits. Corequisite(s): ECE 201 or EGR 203.

ECE 203. Introduction to MATLAB Programming. 1 Hour
MATLAB system and development environment, vector and matrix operations using MATLAB, linear algebra and calculus using MATLAB, MATLAB graphics, flow control, symbolic math toolbox. Prerequisite(s): (CPS 132 or CPS 150) or equivalent.

ECE 204. Electronic Devices. 3 Hours
Study of the terminal characteristics of electronic devices and basic single stage amplifier configurations using bipolar junction transistors and field-effect transistors. Analysis of the devices includes a qualitative physical description, volt-ampere curves, and the development of small- and large-signal equivalent circuit models. Prerequisite(s): EGR 203. Corequisite(s): ECE 204L.

ECE 204L. Electronic Devices Laboratory. 1 Hour
Laboratory investigation of electronic devices: diodes, bipolar junction transistors, field-effect transistors and operational amplifiers. Corequisite(s): ECE 204.

ECE 215. Introduction to Digital Systems. 3 Hours
Introduction to binary systems, logic circuits, Boolean algebra, simplification methods, combinational circuits and networks, programmable logic devices, flip flops, registers, counters, memory elements, and analysis and design of sequential circuits. Prerequisite(s): EGR 203 or ECE 201. Corequisite(s): ECE 215L.

ECE 215L. Digital Systems Laboratory. 1 Hour
Laboratory investigation of digital logic circuits and systems covered in ECE 215. Logic gate characteristics; combinational logic design and analysis; latches and flip-flops; synchronous and asynchronous sequential logic; simple digital systems. Experiments include design and analysis of digital systems using breadboarding, FPGA boards, modeling and simulation tools, hardware description languages, and logic synthesis tools. Prerequisite(s): ECE 201, ECE 201L. Corequisite(s): ECE 215.

ECE 298. Multidisciplinary Research & Innovation Laboratory. 1-6 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis, and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

ECE 300. Professional Development Seminar II. 0 Hours
Junior level professional development seminar. Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all junior ECE students. Prerequisite(s): ECE 200.

ECE 303. Signals & Systems. 3 Hours
Mathematical framework associated with the analysis of linear systems including signal representation by orthogonal functions, convolution, Fourier and Laplace analysis, and frequency response of circuits and systems. Prerequisite(s): ECE 204; MTH 219. Corequisite(s): ECE 303L.

ECE 303L. Signals & Systems Laboratory. 1 Hour
Laboratory investigation of signals and systems including signal decomposition, system impulse response, convolution, frequency analysis of systems, and filter design and realization. Prerequisite(s): ECE 204. Corequisite(s): ECE 303.

ECE 304. Electronic Systems. 3 Hours
ELECTRONIC SYSTEMS Study of cascaded amplifiers, feedback amplifiers, linear integrated circuits, and oscillators including steady state analysis and analysis of frequency response. Prerequisite(s): ECE 303. Corequisite(s): ECE 304L.

ECE 304L. Electronic Systems Laboratory. 1 Hour
Design, construction and verification of multistage amplifiers, differential amplifiers, feedback amplifiers, passive and active filters, and oscillators. Prerequisite(s): ECE 303. Corequisite(s): ECE 304.

ECE 314. Fundamentals of Computer Architecture. 3 Hours
Study of computer systems organization, representation of data and instructions, instruction set architecture, processor and control units, memory devices and hierarchy, I/O devices and interfacing peripherals, high- to low-level language mapping, system simulation and implementation, applications and practical problems. Prerequisite(s): CPS 150; ECE 215. Corequisite(s): ECE 314L.

ECE 314L. Fundamentals of Computer Architecture Laboratory. 1 Hour
Laboratory investigation of digital computer architecture covered in ECE 314. Computer sub-systems such as central processing units, control units, I/O units, and hardware/software interfaces will be experimentally considered. Simulation and implementation will be used to study applications and practical problems. Prerequisite(s): ECE 215. Corequisite(s): ECE 314.

ECE 316. Introduction to Electrical Energy Systems. 3 Hours
A broad introduction to electric energy concepts. Generation, transmission, distribution, and utilization of electric energy. Renewable energy, three phase systems, transformers, power electronics, motors and generators. Contemporary topics. Prerequisite(s): EGR 203 or equivalent.

ECE 332. Electromagnetics. 3 Hours
Study of vector calculus, electro- and magneto-statics, Maxwell's equations, and electromagnetic plane waves and their reflection and transmission from discontinuities. Prerequisite(s): PHY 232.

ECE 333. Applied Electromagnetics. 3 Hours
Electromagnetic theory applied to problems in the areas of waveguides, radiation, electro-optics and electromagnetic interference and electromagnetic compatibility. Prerequisite(s): ECE 332.

ECE 334. Discrete Signals & Systems. 3 Hours
Introduction to discrete signals and systems including sampling and reconstruction of continuous signals, digital filters, frequency analysis, the z-transform, and the discrete Fourier transform. Prerequisite(s): ECE 303.

ECE 340. Engineering Probability & Random Processes. 3 Hours
Axiomatic probability, derived probability relationships, conditional probability, statistical independence, total probability and Bayes' Theorem, counting techniques, common random variables and their distribution functions, transformations of random variables, moments, autocorrelation, power spectral density, cross correlation and covariance, random processes through linear and nonlinear systems, linear regression, and engineering decision strategies. Prerequisite(s): ECE 303; MTH 218.

ECE 398. Multidisciplinary Research & Innovation Laboratory. 1-6 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis, and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

ECE 401. Communication Systems. 3 Hours
Study of amplitude, angle, pulse, and digital communication systems including generation, detection, and analysis of modulated signals and power, bandwidth, and noise considerations. Prerequisite(s): ECE 304, 340. Corequisite(s): ECE 401L.

ECE 401L. Communication Systems Laboratory. 1 Hour
Design, fabrication, and laboratory investigation of modulators, detectors, filters, and associated communication components and systems. Prerequisite(s): ECE 304. Corequisite(s): ECE 401.

ECE 414. Electromechanical Devices. 3 Hours
Properties and theory of electromechanical devices: nonlinear electro-magnetic actuators; rotating machine analysis; field and circuit concepts and direct current, synchronous, and induction machines: special-purpose machines and fractional horsepower machines. Prerequisite(s): ECE 316 or equivalent.

ECE 415. Control Systems. 3 Hours
Study of mathematical models for control systems and analysis of performance characteristics and stability. Design topics include pole-placement, root locus, and frequency domain techniques. Prerequisite(s): ECE 303.

ECE 416. Introduction to Industrial Robotic Manipulators. 3 Hours
Topics include homogeneous transformations, direct and inverse kinematics, trajectory generation, and selected topics of robot vision. Prerequisite(s): ECE 303.

ECE 431L. Multidisciplinary Engineering Design Laboratory I. 2 Hours
Application of engineering fundamentals to sponsored multidisciplinary-team design projects. In a combination of lecture and lab experiences, students learn the product realization process and project management. Product realization topics include idea generation, proposal development, design specifications, conceptualization and decision analysis. Project management topics include cost estimation and intellectual property management. Design projects progress to the proof of concept and prototype development stages. Prerequisite(s): MEE students: EGM 303, MEE 321, and MEE 344 ECE students: ECE 304 and ECE 314.

ECE 432L. Multidisciplinary Design II. 3 Hours
One hour lecture and five hours of lab per week. Detailed evaluation of the Product Realization Process focusing on conceptual design, embodiment design, final design and prototyping is taught. Analysis of the design criteria for safety, ergonomics, environment, cost and sociological impact is covered. Periodic oral and written status reports are required. The course culminates in a comprehensive written report and oral presentation. CPE majors' prerequisites: ECE 431L and (ECE 334 or ECE 340 or CPS 356) and (ECE 444 or CPS 444) ELE majors' prerequisites: ECE 431L and (ECE 333 or ECE 334 or ECE 340) and (ECE 401 or ECE 415).

ECE 433. Project Management & Innovation. 1 Hour
Introduces students and teams to project management, entrepreneurship, and innovation. Topics include project management,cost estimating, time value of money, patent law, marketing, finance, and business plan development. Prerequisite(s): Junior status.

ECE 440. Physical Electronics. 3 Hours
Introduction to wave mechanics, electron ballistics, theory of metals and semiconductors, electron emission, space charge flow, and modern electron devices. Prerequisite(s): MTH 219; PHY 232.

ECE 441. Integrated Circuit Electronics. 3 Hours
Integrated circuit design, construction and verification including the study of biasing, multistage differential and analog power amplification, and computer assisted design tools for "on-chip" design and layout. Prerequisite(s): ECE 304.

ECE 442. Engineering Electromagnetics. 3 Hours
Processing Maxwell's equations and applying the predictions to the analysis and design of engineering systems that make use of electromagnetic energy from ELF through optical frequencies. Topics include propagation, radiation, interactions with matter, guided waves, and antenna fundamentals. Prerequisite(s): ECE 333.

ECE 443. Introduction to Electro-Optics. 3 Hours
Introductory overview of electro-optics starting with Maxwell's equations and leading to lasers, holography, and other timely applications. Prerequisite(s): ECE 332.

ECE 444. Advanced Digital Design. 3 Hours
Systems approach to digital design including: structured top-down development process using simple and complex logic modules from various logic families; practical aspects of the design, construction, and verification of digital subsystems; application of microcomputer and/or controller as a flexible logic device; real-time embedded systems design; and the use of HDL tools and simulation. Prerequisite(s): ECE 314.

ECE 445. Signal Processing. 3 Hours
Study of signal conditioning, digital signal processing, and data processing. Topics include transducers, high gain amplifier design, digital filtering, and spectrum estimation. Specialized application determined by instructor. Prerequisite(s): ECE 334.

ECE 446. Microelectronic Systems Design. 3 Hours
Basic integrated circuit design concepts, system layout, application of design methodology, the fabrication process, manufacturing limitations of the design process, and CAD/CAE utilization to realize the design process. Prerequisite(s): ECE 304.

ECE 447. Digital Control Systems. 3 Hours
Analysis and synthesis of feedback control systems including digital compensators. Topics include performance and stability analysis, regulator and servomechanism design using time and frequency domain methods, and digital implementation case studies. Prerequisite(s): ECE 415; ECE 334 or equivalent.

ECE 448. Fiber Optic Communications. 3 Hours
General light guidance principles; ray optics; dispersion; single mode, multimode, and graded index fibers; basic laser and LED source principles; photodetectors; error probability in digital optical systems; rise time analysis; loss budget analysis; local area networks and long haul communication links. Prerequisite(s): ECE 333 Corequisite(s): ECE 401.

ECE 449. Computer Systems Engineering. 3 Hours
An introduction to advanced computer architecture and computer systems design. Topics include: exploration of principle architecture features of modern computers, pipelining, memory hierarchy, I/O devices, interconnection networks, introduction to parallel and multiprocessor systems, and the use of hardware description languages (HDLs) in system implementation. Prerequisite(s): ECE 444; (CPS 346 or permission of instructor).

ECE 450L. Projects Laboratory. 1-3 Hours
Project-oriented laboratory applying engineering skills in the design, development, and demonstration of electrical and electronic systems. Prerequisite(s): Permission of project advisor.

ECE 471. Contemporary Power Systems & the Smart Grid. 3 Hours
Introduction to electrical power systems; generation, transmission and utilization; power system analysis; power system control; energy management; and an introduction to smart grid technologies. Prerequisites(s): ECE 316 or equivalent.

ECE 472. Smart Grid Technologies. 3 Hours
An introductory study of enabling technologies and energy issues necessary for full realizaton of the Smart Grid. Course topics vary. This course can be taken multiple times. Prerequisite(s): ECE 471 or equivalent.

ECE 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

ECE 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): ECE 493.

ECE 498. Multidisciplinary Research & Innovation Laboratory. 1-6 Hours
Students participate in 1.) selection and design, 2.) investigation and data collection, 3.) analysis, and 4.) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

ECE 499. Special Problems in Electrical & Computer Engineering. 1-6 Hours
Particular assignments to be arranged and approved by the department chairperson.

Engineering Management

Minors:

- Engineering Management
- Operations Engineering

Minor in Engineering Management (ENM)

This twelve credit hour minor is open to all engineering and engineering technology majors. Completion of this minor will provide the student with understanding of basic concepts relevant to the management of engineering operations. Students who anticipate moving from technical to managerial positions during their careers may wish to consider this minor.

ENM 505	Management of Engineering Systems	3
ENM 530	Engineering Economy	3
or ISE 430	Engineering Economy	
Select two courses from:		6
ENM 500	Probability & Statistics for Engineers	
ENM 515	Human Factors Engineering	
ENM 534	Decision Making	
ENM 539	System Engineering/Project Management	
ENM 560	Quality Assurance	
ENM 565	Reliability Engineering I	
ENM 582	Engineering Organizational Development	
ISE 300	Probability & Statistics for Engineers	
ISE 421	Introduction to Operations Research [1]	
ISE 455	Production Engineering	

ISE 460	Quality Assurance	
ISE 465	Reliability & Maintainability	
MSC 521	Introduction to Operations Research	
MSC 555	System Dynamics I	
MSC 572	System Simulation	
Total Hours		12

1 ENM 500 (or ISE 300 or MTH 367) is a prerequisite.

Minor in Operations Engineering (OPE)

This twelve hour minor is open to all engineering and engineering technology majors. Completion of this minor will provide the student with a strong foundation in the analytical tools needed to plan, design, optimize, and manage complex engineering operations. Students who anticipate moving into problem-solving and decision-support roles during their engineering careers may wish to consider this minor.

ENM 500	Probability & Statistics for Engineers	3
or ISE 300	Probability & Statistics for Engineers	
ISE 421	Introduction to Operations Research [1]	3
or MSC 521	Introduction to Operations Research	
MTH 367	Statistical Methods I	3
Select one course from:		3
ENM 560	Quality Assurance [2]	
ENM 561	Design & Analysis of Experiments	
ENM 565	Reliability Engineering I	
ISE 460	Quality Assurance	
MSC 572	System Simulation	
Total Hours		12

1 ENM 500 (or ISE 300 or MTH 367) is a corequisite.

2 ENM 500 (or ISE 300 or MTH 367) is a prerequisite.

Engineering Technology

Majors:

- Bachelor of Science in Engineering Technology, Electronic and Computer Engineering Technology
- Bachelor of Science in Engineering Technology, Industrial Engineering Technology
- Bachelor of Science in Engineering Technology, Global Manufacturing Systems Engineering Technology
- Bachelor of Science in Engineering Technology, Mechanical Engineering Technology

Minors:

- Automotive Systems
- Electronic and Computer Engineering Technology
- Engineering Technology
- Global Manufacturing Systems Engineering Technology
- Industrial Automation and Applied Robotic Systems
- Industrial Engineering Technology
- Integrated Arts and Technology
- Mechanical Engineering Technology
- Quality Assurance
- Sustainable Manufacturing

The School of Engineering also offers a Bachelor of Science in Engineering Technology. The programs in which the degree is offered are electronic and computer engineering technology, global manufacturing systems engineering technology, industrial engineering technology, and mechanical engineering technology. The engineering technologist is usually involved in the design, performance evaluation, service and sales of products, equipment, and manufacturing systems, or the management of these activities. The management of process operations and plant facilities are also important career paths.

The engineering technology programs provide: (1) specialized technical courses that emphasize rational thinking and the application of engineering and scientific principles to the practical solution of technological problems; (2) courses in applied mathematics and science sufficient to support the technical courses and to prepare the student for future growth; and (3) education to prepare students to communicate intelligently and to take places in society as responsible, humane, complete professionals.

The University of Dayton engineering technology programs prepare graduates who:

- are competent and productive in the practice of both the technical and communication aspects of their profession
- demonstrate ethical and professional standards of conduct
- exhibit leadership qualities as appropriate for the practice of their profession
- are involved in service activities that benefit their profession and their community
- are engaged in continuing professional development.

Electronic and Computer Engineering Technology

The Electronic and Computer Engineering Technology Program (ECT) prepares students for careers in the electronics and computer fields. The ECT curriculum, while including a strong emphasis on computers, centers on applied engineering topics in circuit analysis, analog and digital electronic design, digital communications, digital circuits, microprocessors, software, and data acquisition instrumentation. The graduate is prepared to work in industry at a variety of tasks including analog and digital design, microprocessor hardware and software applications, electronic controls, automation, engineering sales and support, product design and development, and data communications. The curricula provide the strong foundation in the basic principles necessary to support any future career studies or development as dictated by changing technology or career roles.

Faculty

Scott Schneider, Chairperson of Department of Engineering Technology
Professors Emeriti: Farren, Hanneman, Hazen
Professor: Segalewitz
Associate Professors: Globig, Schneider
Lecturer: Esmaeili

Bachelor of Science in Engineering Technology, Electronic and Computer Engineering Technology (ECT) minimum 131 hours

Common Academic Program (CAP)

*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CMM 100	Principles of Oral Communication	3
ECT 110	Electrical Circuits I	3
ECT 110L	Electrical Circuits I Laboratory	1
ECT 120	Electrical Circuits II	3
ECT 206 & 206L	Electron Devices I and Electron Devices I Laboratory	4
ECT 224 & 224L	Digital Computer Fundamentals and Digital Computer Fundamentals Laboratory	4
ECT 306 & 306L	Electronic Devices II and Electronic Devices II Laboratory	4
ECT 357	Microprocessors I	3
ECT 358 & 358L	Microprocessors II and Microprocessors II Laboratory	4
ECT 361	Programming Structures	3
ECT 362	Concepts & Applications of Computer Operating Systems	3
ECT 408	Data Acquisition & Measurements	2
ECT 452	Feedback Controls	3
ECT 465	Digital Data Communications	3
ECT 466	Microcomputer Architecture	3
ECT 490	Senior Project	3
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II [1]	6
or ENG 200H	Writing Seminar II	
HST 103	West and the World	3
or HST 198	History Scholars' Seminar	
IET 316	Quantitative Analysis	3
IET 317	Industrial Economic & Financial Analysis	3
IET 323	Project Management	3
MCT 110L	Technical Drawing & CAD Laboratory	2
MCT 220	Statics & Dynamics	3
MFG 431	Controls for Industrial Automation	3
MTH 137	Calculus I with Review	4
MTH 138	Calculus I with Review	4
MTH 207	Introduction to Statistics	3
PHL 103	Intro To Philosophy	3
PHY 201 & 201L	College Physics I and College Physics Laboratory I	4
REL 103	Introduction to Religious and Theological Studies	3
SET 100	Introduction to Engineering Technology I (2 semesters)	0
SET 101	Introduction to Engineering Technology II (2 semesters)	0
SET 153L	Technical Computation Laboratory	1
SET 200	Professional Development for Sophomores	0
SET 200	Professional Development for Sophomores	0
SET 400	Professional Development for Seniors	1
Electives		15
Technical electives [2]		12
Total Hours		131

1 The University's general reading and writing competency requirements are satisfied by completing ENG 100 and ENG 200, or ENG 200H with a grade of C- or higher. Students admitted to the University Honors program and students with sufficiently high verbal scores on the SAT and ACT are placed in ENG 200H. ENG 200H is a one-semester course which satisfies the University requirement. Students who are placed in ENG 200H do not receive credit for ENG 100 but are free to take elective course work in place of the waived first semester of composition.

2 Select from list approved by the Department of Engineering Technology.

Minor in Electronic and Computer Engineering Technology (ECT)

This minor provides a concentration in the electronic and computer field that will compliment the student's major program of study. It is open to all engineering technology majors except electronic or computer engineering technology. It is also available for other majors within the University if certain prerequisites have been met.

ECT 120	Electrical Circuits II	3
ECT 224 & 224L	Digital Computer Fundamentals and Digital Computer Fundamentals Laboratory	4
Select one emphasis from: [1,2]		6-8
Analog Devices Emphasis		
ECT 206 & 206L	Electron Devices I and Electron Devices I Laboratory	
ECT 306 & 306L	Electronic Devices II and Electronic Devices II Laboratory	
Microprocessor Emphasis		
ECT 357	Microprocessors I	
ECT 358 & 358L	Microprocessors II and Microprocessors II Laboratory	
Software Emphasis		
ECT 361	Programming Structures	
ECT 362	Concepts & Applications of Computer Operating Systems	
Total Hours		13-15

1 Courses cannot be already required for student's major.

2 Accompanying laboratories are recommended but not required.

Industrial Engineering Technology

The Industrial Engineering Technology Program has as its objective providing specialized education to prepare students for management and technical staff positions in manufacturing and service organizations such as health care, banking, transportation, food service, and government. Graduates may be involved in the economic selection and location of equipment, the planning of work methods and expected output, quality assurance, facilities layout, and scheduling and controlling the flow of materials. The curriculum emphasizes courses in work measurement, planning and control of lean processes, human factors, safety, facilities layout design and simulation, economic and financial analysis, statistical process control, management of projects and global technical organizations, cost estimating and cost control, and mathematical decision-making.

Faculty

Scott Schneider, Chairperson of the Department of Engineering Technology
Charlie Edmonson, Program Coordinator
Professors: Edmonson, Untener
Associate Professor: Blust
Assistant Professors: Appiah-Kubi, Johnson

Bachelor of Science in Engineering Technology, Industrial Engineering Technology (IET) minimum 131 hours

Common Academic Program (CAP)

*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CMM 100	Principles of Oral Communication	3
ECT 110 & 110L	Electrical Circuits I and Electrical Circuits I Laboratory	4
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II [1]	6
or ENG 200H	Writing Seminar II	
HST 103 or HST 198	West and the World History Scholars' Seminar	3
IET 230	Work Measurement	3
IET 316	Quantitative Analysis	3

IET 317	Industrial Economic & Financial Analysis	3
IET 318	Statistical Process Control	3
IET 323	Project Management	3
IET 332	Facilities Layout Design	3
IET 408	Lean Management Methods	3
IET 415	Management of Global Technical Organizations	3
IET 418	Cost Estimating & Control	3
IET 420	Industrial & Environmental Safety	3
IET 435	Human Factors	3
IET 490	Senior Project	3
MCT 110L	Technical Drawing & CAD Laboratory	2
MCT 111L	Introduction to Design Laboratory	2
MCT 220	Statics & Dynamics	3
MCT 313	Industrial Mechanisms	3
MFG 108L	Manufacturing Processes Laboratory	1
MFG 204 & 204L	Materials & Processes and Materials & Processes Laboratory	4
MFG 206L	Dimensional Metrology Laboratory	1
MFG 208L	Geometric Dimensioning & Tolerancing Laboratory	1
MFG 438	Sustainable Manufacturing & Product Design	3
MTH 137	Calculus I with Review	4
MTH 138	Calculus I with Review	4
MTH 207	Introduction to Statistics	3
PHL 103	Intro To Philosophy	3
PHY 201 & 201L	College Physics I and College Physics Laboratory I	4
REL 103	Introduction to Religious and Theological Studies	3
SET 100	Introduction to Engineering Technology I (2 semesters)	0
SET 101	Introduction to Engineering Technology II (2 semesters)	0
SET 153L	Technical Computation Laboratory	1
SET 200	Professional Development for Sophomores (2 semesters)	0
Electives		15
SET 400	Professional Development for Seniors	1
Technical electives [2]		15
Total Hours		131

1 The University's general reading and writing competency requirements are satisfied by completing ENG 100 and ENG 200, or ENG 200H with a grade of C- or higher. Students admitted to the University Honors program and students with sufficiently high verbal scores on the SAT and ACT are placed in ENG 200H. ENG 200H is a one-semester course which satisfies the University requirement. Students who are placed in ENG 200H do not receive credits for ENG 100 but are free to take elective course work in place of the waived first semester of composition.

2 Select from list approved by the Department of Engineering Technology.

Minor in Industrial Engineering Technology (IET)

This minor is open to all majors except industrial engineering technology. The program provides a concentration in the industrial field that will complement the student's major field of study. All prerequisites and corequisites must be followed.

Choose four courses from: [1]		12
IET 230	Work Measurement	
IET 317	Industrial Economic & Financial Analysis	
IET 318	Statistical Process Control	
IET 319	Quality Improvement Methods	
IET 320	Quality Assurance Techniques	
IET 321	Quality Management	
IET 332	Facilities Layout Design	
IET 408	Lean Management Methods	
IET 415	Management of Global Technical Organizations	
IET 418	Cost Estimating & Control	
IET 420	Industrial & Environmental Safety	
IET 435	Human Factors	
IET - Human Performance Emphasis [2]		12
IET 230	Work Measurement	
IET 415	Management of Global Technical Organizations	
IET 420	Industrial & Environmental Safety	
IET 435	Human Factors	
IET - Production Management Emphasis [3]		18
IET 230	Work Measurement	
IET 318	Statistical Process Control	
IET 332	Facilities Layout Design	
IET 408	Lean Management Methods	
IET 418	Cost Estimating & Control	
IET 420	Industrial & Environmental Safety	
IET - Cost Management Emphasis [4]		12
IET 317	Industrial Economic & Financial Analysis	
IET 408	Lean Management Methods	
IET 415	Management of Global Technical Organizations	
IET 418	Cost Estimating & Control	

Minor in Quality Assurance (QUA)

This minor is open to all majors. The program provides a concentration in the field of quality control, quality assurance, and quality management. Upon successful completion of this minor, the student will have command of statistical quality tools as well as the breadth of quality management concepts and experience in practical application of the tools. All prerequisites and corequisites must be followed.

IET 318	Statistical Process Control	3
IET 319	Quality Improvement Methods	3
IET 320	Quality Assurance Techniques	3
IET 321	Quality Management	3
Total Hours		12

Global Manufacturing Systems Engineering Technology

Today's global economy has increasingly become borderless and is dominated by multinational companies. This requires tomorrow's engineers to be able to work efficiently in multicultural teams. The Global Manufacturing Systems Engineering Technology program is creating a

new type of global engineer both answering industry's demand and giving the upcoming engineer a competitive advantage in today's market place.

In the Global Manufacturing Systems Engineering Technology program, state-of-the-art technology is used to plan, design, and implement the tools and machines needed to produce high quality products at competitive prices. Throughout the program, important concepts of lean enterprise, global competitiveness, green engineering concepts, and customer satisfaction will be applied.

The curriculum is highly interdisciplinary since the manufacturing professional must possess extensive technical skills and excellent humanistic skills in communications, computers, teamwork, information technology, globalism, and multiculturalism. The technical courses emphasize engineering materials and manufacturing processes; mechanical, hydraulic, and pneumatic automation and electronic controls; computer integrated manufacturing; manufacturing planning and control; extensive laboratory experiences; the technical sciences and applied mathematics from college algebra, probability, statistics, calculus, and linear programming. The curriculum contains strong components from the humanities, social sciences, and communications, plus foreign language and multicultural requirements. The technical electives allow the student versatility in developing technical breadth or depth. The program is designed to prepare graduates for challenging careers in manufacturing and serves as an excellent foundation for a variety of advanced degree options.

Faculty

Scott Schneider, Chairperson of the Department of Engineering Technology
Professors Emeritus: Simon, Wolff
Professor: Untener
Associate Professor: Falkowski
Assistant Professor: Diller

Bachelor of Science in Engineering Technology, Global Manufacturing Systems Engineering Technology (GMT) minimum 133 hours

Common Academic Program (CAP)

*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CMM 100	Principles of Oral Communication	3
ECT 110 & 110L	Electrical Circuits I and Electrical Circuits I Laboratory	4
ECT 408	Data Acquisition & Measurements	2
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II [1]	6
or ENG 200H	Writing Seminar II	
HST 103	West and the World	3
IET 316	Quantitative Analysis	3
IET 317	Industrial Economic & Financial Analysis	3
IET 318	Statistical Process Control	3
IET 323	Project Management	3
IET 408	Lean Management Methods	3
MCT 110L	Technical Drawing & CAD Laboratory	2
MCT 111L	Introduction to Design Laboratory	2
MCT 220	Statics & Dynamics	3
MCT 221	Strength of Materials	3
MCT 313	Industrial Mechanisms	3
MCT 336 & 336L	Fluid Power and Fluid Power Laboratory	4
MFG 108L	Manufacturing Processes Laboratory [1]	1
MFG 204 & 204L	Materials & Processes and Materials & Processes Laboratory	4
MFG 206L	Dimensional Metrology Laboratory	1
MFG 208L	Geometric Dimensioning & Tolerancing Laboratory	1
MFG 240	Manufacturing & Product Design	3
MFG 427	Computer Integrated Manufacturing & Global Manufacturing	3
MFG 431	Controls for Industrial Automation	3
MFG 432	Plastics, Composites & Nano Materials & Processes	3
MFG 434	Robotics & Computer Numerical Control	3
MFG 438	Sustainable Manufacturing & Product Design	3

MFG 490	Senior Project	3
MTH 137	Calculus I with Review	4
MTH 138	Calculus I with Review	4
MTH 207	Introduction to Statistics	3
PHL 103	Intro To Philosophy	3
PHY 201 & 201L	College Physics I and College Physics Laboratory I	4
REL 103	Introduction to Religious and Theological Studies	3
SET 100	Introduction to Engineering Technology I (2 semesters)	0
SET 101	Introduction to Engineering Technology II (2 semesters)	0
SET 153L	Technical Computation Laboratory	1
SET 200	Professional Development for Sophomores (2 semesters)	0
SET 400	Professional Development for Seniors	1
Electives		15
Language requirements [2]		8
Technical elective [3]		3
Total Hours		133

1 The University's general reading and writing competency requirements are satisfied by completing ENG 100 and ENG 200 or ENG 200H with a grade of C- or higher. Students admitted to the University Honors program and students with sufficiently high verbal scores on the SAT and ACT are placed in ENG 200H.
ENG 200H is a one-semester course which satisfies the University requirement. Students who are placed in ENG 200H do not receive credit for ENG 100 but are free to take elective course work in place of the waived first semester of composition.

2 Students who have no or limited experience in a foreign language will be required to complete a two-course language sequence either LNG 101/LNG 141 (6 sem. hours) depending on their beginning proficiency. Students entering the University of Dayton and enrolled in the program will fulfill this requirement. Students passing the proficiency examination of one or both foreign language course requirements will be required to complete additional Technical electives to fulfill program credits requirements.

3 Select from list approved by the Department of Engineering Technology.

Minor in Global Manufacturing Systems Engineering Technology (GMT)

This minor is open to all engineering technology majors except global manufacturing systems. The program provides a concentration in manufacturing that will complement the student's major field of study. All prerequisites and corequisites must be followed.

Select four courses from: [1]		12
MFG 204 & 204L	Materials & Processes and Materials & Processes Laboratory	
MFG 240	Manufacturing & Product Design	
MFG 424	Robotics	
MFG 427	Computer Integrated Manufacturing & Global Manufacturing	
MFG 431	Controls for Industrial Automation	
MFG 432	Plastics, Composites & Nano Materials & Processes	
MFG 434	Robotics & Computer Numerical Control	
MFG 438	Sustainable Manufacturing & Product Design	
Total Hours		12

1 Courses selected may not be those already required for student's major.

Mechanical Engineering Technology

The Mechanical Engineering Technology Program emphasizes the practical application of the principles of the mechanical field. Career opportunities are in mechanical design, computer-aided design, product evaluation and development, manufacturing engineering, computer-aided manufacturing, plant engineering, technical sales, technical service, fluid power, automation, and supervision. A significant portion of the graduates are in technical management. The curriculum includes a core of technical sciences; applied courses in design, thermodynamics, fluid mechanics, and manufacturing; extensive laboratory experiences; and mathematics from college algebra through probability, statistics, calculus, and differential equations. Courses are required in oral and written communication, with components in the humanities and social sciences to provide insight into the impact of technology on society. Concepts from basic education are stressed in technical courses. The curriculum is broad to prepare graduates for employment and provide a foundation on which to base continued study of changing technology.

Faculty

Scott Schneider, Chairperson of Department of Engineering Technology
Sean Falkowski, Program Coordinator
Professors Emeritus: Mott, Wolff
Professor: Untener
Associate Professors: Blust, Falkowski
Assistant Professor: Diller

Bachelor of Science in Engineering Technology, Mechanical Engineering Technology (MCT) minimum 132 hours

Common Academic Program (CAP)		
*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit

Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		
Diversity and Social Justice		3
Major Capstone		0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123 & 123L	General Chemistry and General Chemistry Laboratory	4
CMM 100	Principles of Oral Communication	3
ECT 110 & 110L	Electrical Circuits I and Electrical Circuits I Laboratory	4
ECT 408	Data Acquisition & Measurements	2
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II [1]	6
or ENG 200H	Writing Seminar II	
HST 103	West and the World	3
IET 316	Quantitative Analysis	3
IET 317	Industrial Economic & Financial Analysis	3
IET 323	Project Management	3
MCT 110L	Technical Drawing & CAD Laboratory	2
MCT 111L	Introduction to Design Laboratory	2
MCT 220	Statics & Dynamics	3
MCT 221	Strength of Materials	3
MCT 231	Fluid Mechanics	3
MCT 313	Industrial Mechanisms	3
MCT 317	Machine Dynamics	3
MCT 330	Design of Machine Elements	3
MCT 336 & 336L	Fluid Power and Fluid Power Laboratory	4
MCT 342	Thermodynamics	3
MCT 490	Mechanical Engineering Technology Senior Project	3
MFG 108L	Manufacturing Processes Laboratory	1
MFG 204 & 204L	Materials & Processes and Materials & Processes Laboratory	4
MFG 206L	Dimensional Metrology Laboratory	1
MFG 208L	Geometric Dimensioning & Tolerancing Laboratory	1
MFG 240	Manufacturing & Product Design	3
MFG 431	Controls for Industrial Automation	3
MTH 137	Calculus I with Review	4
MTH 138	Calculus I with Review	4
MTH 207	Introduction to Statistics	3
PHL 103	Intro To Philosophy	3
PHY 201 & 201L	College Physics I and College Physics Laboratory I	4
PHY 202 & 202L	General Physics and General Physics Laboratory	4
REL 103	Introduction to Religious and Theological Studies	3
SET 100	Introduction to Engineering Technology I (2 semesters)	0
SET 101	Introduction to Engineering Technology II (2 semesters)	0
SET 153L	Technical Computation Laboratory	1
SET 200	Professional Development for Sophomores (2 semesters)	0
SET 400	Professional Development for Seniors	1
Electives		15
Technical electives [2]		12
Total Hours		132

1 The University's general reading and writing competency requirements are satisfied by completing ENG 100 and ENG 200 or ENG 200H with a grade of C- or higher. Students admitted to the University Honors program and students with sufficiently high verbal scores on the SAT and ACT are placed in ENG 200H.
ENG 200H is a one-semester course which satisfies the University requirement. Students who are placed in ENG 200H do not receive credit for ENG 100 but are free to take elective course work in place of the waived first semester of composition.

2 Select from list approved by the Department of Engineering Technology.

Minor in Mechanical Engineering Technology (MCT)

This minor is open to all engineering technology majors except mechanical. The program provides a concentration in the mechanical field that will complement the student's major field of study. All prerequisites and corequisites must be followed.

Select four courses from: [1]		12
MCT 221	Strength of Materials	
MCT 231	Fluid Mechanics	
MCT 313	Industrial Mechanisms	
MCT 330	Design of Machine Elements	
MCT 336 & 336L	Fluid Power and Fluid Power Laboratory	
MCT 342	Thermodynamics	
MCT 423	Product Development	
MCT 430	Design of Fluid Power Systems	
MCT 432	Heat Power	
MCT 438	Heat Transfer	
MCT 440	Applied Vibrations	
MCT 445 & 445L	Experimental Mechanics and Experimental Mechanics Laboratory	
MCT 446	Applied Finite Element Modeling	
Total Hours		12

[1] Courses selected may not be those already required for student's major.

Minor in Automotive Systems (AST)

This minor is open to all engineering technology majors. It is also available for other majors within the University if certain prerequisites have been met. The program provides a concentration in the automotive field that will compliment the student's major program of study.

ECT 456	Automotive Electical & Safety Systems	3
MCT 456	Automotive Powertrain & Chassis Systems	3
Select two courses from: [1]		6
ECT 224	Digital Computer Fundamentals	
ECT 357	Microprocessors I	
IET 332	Facilities Layout Design	
IET 415	Management of Global Technical Organizations	
MCT 231	Fluid Mechanics	
MCT 342	Thermodynamics	
MCT 446	Applied Finite Element Modeling	
MFG 204	Materials & Processes	
MFG 204L	Materials & Processes Laboratory	
MFG 432	Plastics, Composites & Nano Materials & Processes	
Total Hours		12

[1] Courses cannot be required by student's major.

Minor in Engineering Technology (EGT)

This minor is open to all majors in the College of Arts and Sciences, the School of Business Administration and the School of Education and Health Sciences with the appropriate prerequisite background and approval of the Engineering Technology Department Chairperson. The program introduces the principles of applied engineering and complements many majors at the University.

Engineering Technology [1]		15
ECT 110	Electrical Circuits I	3
IET 323	Project Management	3
MCT 110L	Technical Drawing & CAD Laboratory	2
MFG 204 & 204L	Materials & Processes and Materials & Processes Laboratory	4
Select one course from:		3
ECT 120	Electrical Circuits II	
ECT 224	Digital Computer Fundamentals	
ECT 361	Programming Structures	
IET 317	Industrial Economic & Financial Analysis	
IET 408	Lean Management Methods	
IET 415	Management of Global Technical Organizations	
IET 435	Human Factors	
MCT 220	Statics & Dynamics	
MCT 231	Fluid Mechanics	
MFG 427	Computer Integrated Manufacturing & Global Manufacturing	
MFG 432	Plastics, Composites & Nano Materials & Processes	
MFG 434	Robotics & Computer Numerical Control	

[1] Prerequisites: SET 153L or equivalent competency and MTH 137 or equivalent competency.

Minor in Industrial Automation and Applied Robotic Systems (ARS)

This minor is open to all majors in the School of Engineering. The program provides a concentration in the industrial automation and applied robotic systems field that will complement the student's major field of study. All prerequisites and corequisites must be followed.

Industrial Automation and Applied Robotic Systems [1]

ECT 452	Feedback Controls	3
MFG 424	Robotics	3
MFG 431	Controls for Industrial Automation	3
MFG 434	Robotics & Computer Numerical Control	3
Total Hours		12

[1] If the minor's required courses are already required by the student's major, the student may select ECT 224/ECT 224L, MCT 313, and/or MCT 317 to complete a total of at least twelve semester hours. Students in Engineering programs may not select courses with content similar to courses offered in their major.

Minor in Integrated Arts and Technology (IAT)

The Integrated Arts and Technology minor allows students to connect their aptitude for technical discipline with their passion for the arts. Students select one arts program (graphic design, music or theatre) and take at least 12 credits of coursework in that program. To put their knowledge to work in a practical and beneficial setting, students will also complete a service-learning project related to their arts program, which may provide academic credit.

This minor is open to all students enrolled in School of Engineering programs. All prerequisites and corequisites must be followed.

Graphic Design Emphasis

Select four courses from:		12
CMM 344	Multimedia Design & Production I	
CMM 444	Multimedia Design & Producation II	
SET 400	Professional Development for Seniors	
VAD 215	Computer Applications- Design	
VAD 218	Computer Applications- Illustration	
VAD 220	Design Processes I	
VAD 240	Form & Concept	
VAD 310	Computer Illustration	
VAD 320	Design Processes II	
VAD 344	Design for Multimedia I	
VAD 351	Motion Design	
VAD 360	Web Design	
VAP 340	Digital Processes II	
VAR 345	Computer Modeling & Animation I	
VAR 440	Computer Modeling & Animation II	

VAR 445	Computer Modeling & Animation III	
Total Hours		12

Technical Music Emphasis

Select four courses from:		12
CMM 340	Fundamentals of Broadcasting	
CMM 341	Audio Production	
MUS 205	Music, Technology and Culture	
MUS 223	Introduction to Music Technology	
MUS 323	Recording Arts & Digital Media	
SET 400	Professional Development for Seniors	
Total Hours		12

Television and Stage Production Emphasis

Select four courses from:		12
CMM 341	Audio Production	3
CMM 342	Fundamentals of Video Production	3
CMM 442	Advanced Television Production	3
SET 400	Professional Development for Seniors	4
THR 203	Technical Production	3
THR 305	Theatre Stagecraft	3
THR 307	Light Design	3
Total Hours		34

Minor in Sustainable Manufacturing (SMF)

This minor is open to all majors in the School of Engineering, except Global Manufacturing Systems Engineering Technology (GMT). The program provides a concentration in sustainable manufacturing that will complement the student's major field of study. All prerequisites and corequisites must be followed.

Sustainable Manufacturing [1]

ECT 461	Power Distribution & Control	3
MFG 204	Materials & Processes	3
MFG 204L	Materials & Processes Laboratory	1
MFG 432	Plastics, Composites & Nano Materials & Processes	3
MFG 438	Sustainable Manufacturing & Product Design	3
Total Hours		13

1 If the minor's required courses are already required by the student's major, the student may select IET 420, MEE 472, MEE 473, MEE 478, and/or SEE 250 to complete a total of at least twelve semester hours. Students in Engineering programs may not select courses with content similar to courses offered in their major.

Electronic and Computer Engineering Technology

First Year

Fall	Hours	Spring	Hours
CHM 123 (Satisfies CAP Natural Science)	3	CMM 100 (Satisfies CAP Communication)	3
CHM 123L	1	EGR 100	0
ENG 100 (Satisfies CAP Writing Seminar)	3	HST 103 (Satisfies CAP First-Year Humanities Common)	3
MTH 137 (Satisfies CAP Math Requirement)	4	MTH 138	4
PHL 103 (Satisfies CAP First-Year Humanities Common)	3	REL 103 (Satisfies CAP First-Year Humanities Common)	3
SET 100	0	SET 100	0
SET 153L	1	ECT 110	3
EGR 100	0	ECT 110L	1
EGR 103	2		
	17		**17**

Second Year

Fall	Hours	Spring	Hours
SET 200	0	SET 200	0
ECT 361	3	MCT 220	3
PHY 201	3	ECT 357	3
PHY 201L	1	ECT 206	3
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3	ECT 206L	1
ECT 224	3	MTH 207	3
ECT 224L	1	SSC 200	3
ECT 120	3		
	17		**16**

Third Year

Fall	Hours	Spring	Hours
MCT 110L	2	ECT 408	2
IET 316	3	ECT 362	3
Art Study (Satisifies CAP Art Study)	3	ECT 465	3
ECT 358	3	TECH Elective	3
ECT 358L	1	Advanced PHL Ethics (Satisifies CAP Crossing Boundaries and Practical Ethical Action)	3
ECT 306	3	MFG 431	3
ECT 306L	1		
	16		**17**

Fourth Year

Fall	Hours	Spring	Hours
Advanced REL (Satisifies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice)	3	ECT 490	3
ECT 466	3	ECT 452	3
IET 317	3	TECH Elective	3
IET 323	3	TECH Elective	3
SET 400	1	Advanced HST (Satisifies CAP Crossing Boundaries)	3

TECH Elective	3		
	16		**15**

Total credit hours: 131

Industrial Engineering Technology

First Year

Fall	Hours	Spring	Hours
SET 100	0	MFG 204	3
EGR 100	0	MFG 204L	1
EGR 103	2	SET 100	0
CHM 123 (Satisfies CAP Natural Science)	3	EGR 100	0
CHM 123L	1	HST 103 (Satisfies CAP First-Year Humanities Common)	3
ENG 100 (Satisfies CAP Writing Seminar)	3	PHL 103 (Satisfies CAP First-Year Humanities Common)	3
REL 103 (Satisfies CAP First-Year Humanities Common)	3	MTH 138	4
SET 153L	1	IET 230	3
MTH 137 (Satisfies CAP Math Requirement)	4		
	17		**17**

Second Year

Fall	Hours	Spring	Hours
IET 323	3	SET 200	0
MCT 110L	2	MCT 313	3
MCT 220	3	IET 318	3
MTH 207	3	MCT 111L	2
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3	Art Study (Satisifies CAP Art Study)	3
SET 200 (Satisfies CAP Second Year Writing Seminar)	0	MFG 208L	1
IET 317	3	MFG 206L	1
		CMM 100 (Satisfies CAP Communication)	3
	17		**16**

Third Year

Fall	Hours	Spring	Hours
IET 408	3	IET 418	3
PHY 201L	1	IET 316	3
MFG 108L	1	ECT 110	3
MFG 438	3	ECT 110L	1
IET 332	3	TECH Elective	3
PHY 201	3	Advanced PHL Ethics (Satisifies CAP Crossing Boundaries and Practical Ethical Action)	3
SSC 200	3		
	17		**16**

Fourth Year

Fall	Hours	Spring	Hours
IET 420	3	IET 490	3
Advanced REL (Satisifies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice	3	IET 415	3
IET 435	3	TECH Elect	3
SET 400	1	TECH Elect	3
TECH Elect	3	Advanced HST (Satisifies CAP Crossing Boundaries)	3
TECH Elect	3		
	16		**15**

Total credit hours: 131

Global Manufacturing Systems Engineering Technology

First Year

Fall	Hours	Spring	Hours
SET 100	0	MFG 204	3
EGR 100	0	MFG 204L	1
MFG 108L	1	MTH 138	4
CHM 123 (Satisfies CAP Natural Science)	3	SET 100	0
CHM 123L	1	EGR 100	0
ENG 100 (Satisfies CAP Writing Seminar)	3	PHL 103 (Satisfies CAP First-Year Humanities Common)	3
REL 103 (Satisfies CAP First-Year Humanities Common)	3	HST 103 (Satisfies CAP First-Year Humanities Common)	3
MCT 110L	2	SET 153L	1
MTH 137 (Satisfies CAP Math Requirement)	4	EGR 103	2
	17		**17**

Second Year

Fall	Hours	Spring	Hours
MFG 206L	1	ECT 110	3
IET 408	3	ECT 110L	1
MCT 220	3	SET 200	0
SET 200	0	IET 318	3
CMM 100 (Satisfies CAP Communication)	3	MFG 240	3
MTH 207	3	MCT 221	3
MCT 111L	2	ENG 200 (Satisfies CAP Second Year Writing Seminar)	3
MFG 208L	1		
	16		**16**

Third Year

Fall	Hours	Spring	Hours
MCT 336	3	IET 323	3
MFG 434	3	MFG 431	3
PHY 201	3	Language Requirement	3
PHY 201L	1	TECH Elect	3

MFG 432	3	Art Study (Satisifies CAP Art Study)	3
MCT 336L	1		
MCT 313	3		
	17		**15**

Fourth Year

Fall	Hours	Spring	Hours
IET 317	3	MFG 490	3
Language Requirement	3	MFG 427	3
Advanced PHL Ethics (Satisifies CAP Crossing Boundaries and Practical Ethical Action)	3	ECT 408	2
IET 316	3	SSC 200	3
MFG 438	3	Advanced HST (Satisifies CAP Crossing Boundaries)	3
SET 400	1	Advanced REL (Satisifies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice	3
	16		**17**

Total credit hours: 131

Mechanical Engineering Technology

First Year

Fall	Hours	Spring	Hours
SET 100	0	EGR 100	0
EGR 100	0	MFG 204L	1
MTH 137 (Satisfies CAP Math Requirement)	4	SET 153L	1
MFG 108L	1	MFG 204	3
CHM 123 (Satisfies CAP Natural Science)	3	MCT 110L	2
CHM 123L	1	MTH 138	4
ENG 100 (Satisfies CAP Writing Seminar)	3	PHL 103 (Satisfies CAP First-Year Humanities Common)	3
REL 103 (Satisfies CAP First-Year Humanities Common)	3	HST 103 (Satisfies CAP First-Year Humanities Common)	3
EGR 103	2	SET 100	0
	17		**17**

Second Year

Fall	Hours	Spring	Hours
MFG 208L	1	SET 200	0
MCT 220	3	IET 316	3
SET 200	0	MCT 221	3
MTH 207	3	MCT 231	3
PHY 201	3	MFG 206L	1
PHY 201L	1	PHY 202	3
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3	PHY 202L	1
MCT 111L	2	CMM 100 (Satisfies CAP Communication)	3
	16		**17**

Third Year

Fall	Hours	Spring	Hours
ECT 110	3	IET 317	3
MCT 336	3	MCT 330	3
MCT 336L	1	MFG 240	3
MCT 313	3	MCT 317	3
IET 323	3	MFG 431	3
Art Study (Satisifies CAP Art Study)	3	SET 400	1
ECT 110L	1		
	17		**16**

Fourth Year

Fall	Hours	Spring	Hours
ECT 408	2	MCT 490	3
MCT 342	3	TECH Elective	3
SSC 200	3	TECH Elective	3
TECH Elective	3	Advanced REL (Satisifies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice	3
TECH Elective	3	Advanced HST (Satisifies CAP Crossing Boundaries)	3
Advanced PHL Ethics (Satisifies CAP Crossing Boundaries and Practical Ethical Action)	3		
	17		**15**

Total credit hours: 132

Electronic Computer Tech Courses

ECT 110. Electrical Circuits I. 3 Hours
Practical concepts of single voltage source DC and AC circuits: current, voltage, resistance, power, series and parallel circuits, capacitance, magnetic circuits, and inductance. Corequisite(s): ECT 110L.

ECT 110L. Electrical Circuits I Laboratory. 1 Hour
Experiments in single voltage source DC and AC circuits to accompany ECT 110. Three laboratory hours per week. Corequisite(s): ECT 110.

ECT 120. Electrical Circuits II. 3 Hours
Practical concepts of multiple voltage and current source DC and AC circuits: reactance, impedance, phase, circuit analysis, power factor, resonance, filters, and transformers. Circuit calculations using vectors, complex algebra, and simultaneous equations. Prerequisite(s): ECT 110; MTH 137 or MTH 168.

ECT 206. Electron Devices I. 3 Hours
Fundamentals of semiconductor diodes, transistors (bipolar and field effect), amplifiers, biasing and small signal analysis. Prerequisite(s): ECT 120. Corequisite(s): ECT 206L.

ECT 206L. Electron Devices I Laboratory. 1 Hour
To accompany ECT 206. Three hours of laboratory a week. Corequisite(s): ECT 206.

ECT 224. Digital Computer Fundamentals. 3 Hours
Fundamental theory and techniques of electronic data processing to include binary arithmetic, switching theory (Boolean algebra), and basic circuitry (gates, adders, registers, and memory). Prerequisite(s): ECT 110. Corequisite(s): ECT 224L.

ECT 224L. Digital Computer Fundamentals Laboratory. 1 Hour
To accompany ECT 224. Three hours of laboratory a week. Corequisite(s): ECT 224.

ECT 306. Electronic Devices II. 3 Hours
Fundamentals of integrated circuits, operational amplifiers, transistors, photoelectric devices, silicon-controlled rectifiers, and their associated circuits. Prerequisite(s): ECT 206; MTH 138 or MTH 168. Corequisite(s): ECT 306L.

ECT 306L. Electronic Devices II Laboratory. 1 Hour
To accompany ECT 306. Three hours of laboratory a week. Corequisite(s): ECT 306.

ECT 357. Microprocessors I. 3 Hours
Study of microprocessor architecture, hardware, software, applications, and development tools. Prerequisite(s): ECT 224.

ECT 358. Microprocessors II. 3 Hours
Advanced microprocessors study including development tools and software with regards to interfacing equipment in applications. Prerequisite(s): ECT 224, ECT 361. Corequisite(s): ECT 358L.

ECT 358L. Microprocessors II Laboratory. 1 Hour
To accompany ECT 358. Emphasis on microcomputer programming. Three hours of laboratory a week. Corequisite(s): ECT 358.

ECT 361. Programming Structures. 3 Hours
The study of programming language concepts. Emphasis on the C language and its application to microcomputer hardware and software development. Prerequisite(s): SET 153L.

ECT 362. Concepts & Applications of Computer Operating Systems. 3 Hours
Introduction to the fundamentals and applications of computer operating systems and the interaction of hardware and software. Operating systems for large-scale, mini-, and microcomputers introduced through case studies. Prerequisite(s): ECT 361.

ECT 400. Selected Topics. 1-4 Hours
Investigation and discussion of current technical topics in electronic and computer engineering technology. May be taken more than once. Prerequisite(s): Permission of department chairperson.

ECT 408. Data Acquisition & Measurements. 2 Hours
Measurement and evaluation of the characteristics of engineering materials, structural mechanics, electromechanical systems, and physical systems. Emphasis on data acquisition, signal conditioning and manipulation, and virtual instrumentation. Prerequisite(s): ECT 110L; SET 153L; MTH 138 or MTH 168, MTH 207.

ECT 448. Intro to Linguistics. 3 Hours

ECT 452. Feedback Controls. 3 Hours
Study of principles of control including Nyquist criteria, Bode plots, PID loops, motor control virtual instrumentation, and advanced concepts. Laplace transform analysis is utilized. Prerequisite(s): ECT 306, ECT 408; MTH 138 or MTH 168.

ECT 456. Automotive Electical & Safety Systems. 3 Hours
Theory and design of charging systems, batteries, control systems, safety systems, and various sensor technologies. Overview of manufacturing and commercial aspects of the automotive industry. Prerequisite(s): ECT 110 or EGR 203.

ECT 461. Power Distribution & Control. 3 Hours
Study of power distribution systems including components, basic operation, polyphase circuits, characteristics, and application. Emphasis on the generation of electric power, its transmission, and its application to high power systems. Prerequisite(s): ECT 110.

ECT 465. Digital Data Communications. 3 Hours
Study of communication methods and protocols. Applications to networks, satellite communication, phone systems, fiber optics, modems, and other data transmission. A special emphasis is placed on digital networks. Prerequisite(s): ECT 224.

ECT 466. Microcomputer Architecture. 3 Hours
To develop an understanding of the basic hardware architecture of industry standard microcomputers including CPUs, standard busses, memory, mass storage devices, Systems-on-a-Chip and their implementation, I/O devices, and network interfaces. Study of architecture of recent microprocessors. Prerequisite(s): ECT 358.

ECT 490. Senior Project. 3 Hours
The design, construction and presentation of an original project. The project may be individual or part of an interdisciplinary engineering technology team project. Written and oral reports. Prerequisite(s): CMM 100 or CMM 110 and (CMM 111 or CMM 112); ECT 306, ECT 358, ECT 408; IET 323; MTH 138 or MTH 168.

ECT 493. Honors Thesis. 3 Hours
HONORS THESIS.

ECT 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): ECT 493.

Engineering Technology Courses

SET 100. Introduction to Engineering Technology I. 0 Hours
First semester of introduction to Engineering Technology seminar for all engineering technology majors. Introduction to the University of Dayton, the School of Engineering, the Department of Engineering Technology, engineering technology programs and careers. Emphasizes professional ethics, critical thinking and communications, and team dynamics. Academic policies, academic planning, registration procedures, counseling and career placement services.

SET 101. Introduction to Engineering Technology II. 0 Hours
Second semester of introduction to Engineering Technology seminar for all engineering technology majors. Introduction to the University of Dayton, the School of Engineering, the Department of Engineering Technology, engineering technology programs and careers. Emphasizes professional ethics, critical thinking and communications, and team dynamics. Academic policies, academic planning, registration procedures, counseling and career placement services.

SET 102. Engineering Technology Transfer Seminar. 0 Hours
A seminar for Engineering Technology majors who transferred from another academic institution. Introduction to the University of Dayton, the School of Engineering, the Department of Engineering Technology, Engineering Technology programs, and careers. Emphasizes professional ethics, critical thinking and communication, and team dynamics. Academic policies, academic planning, registration procedures, counseling, and career placement services.

SET 153L. Technical Computation Laboratory. 1 Hour
Introduction to applications and use of computers for engineers with concentration on spreadsheets, electronic communications, and object oriented programming using Visual Basic.

SET 198. Research & Innovation Laboratory. 1-6 Hours
Students participate in 1) selection and design, 2) investigation and data collection, 3) analysis and 4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered. Prerequisite(s): Permission of department chairperson.

SET 200. Professional Development for Sophomores. 0 Hours
Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all Engineering Technology sophomore students.

SET 298. Research & Innovation Laboratory. 1-6 Hours
Students participate in 1) selection and design, 2) investigation and data collection, 3) analysis and 4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered. Prerequisite(s): Permission of department chairperson.

SET 300. Professional Development for Juniors. 0 Hours
Presentations on contemporary and professional engineering subjects by students, faculty, and engineers in active practice. The seminar addresses topics in key areas that complement traditional courses and prepare distinctive graduates, ready for life and work. Registration required for all Engineering Technology sophomore students.

SET 398. Research & Innovation Laboratory. 1-6 Hours
Students participate in 1) selection and design, 2) investigation and data collection, 3) analysis and 4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered. Prerequisite(s): Permission of department chairperson.

SET 400. Professional Development for Seniors. 1 Hour
Career planning for engineering technology majors. The job search process, resume preparation, the job interview, professional development. Required of all engineering technology majors in the junior or senior year.

SET 498. Research & Innovation Laboratory. 1-6 Hours
Students participate in 1) selection and design, 2) investigation and data collection, 3) analysis and 4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered. Prerequisite(s): Permission of department chairperson.

Global Manufact Sys Egr Tech Courses

MFG 108L. Manufacturing Processes Laboratory. 1 Hour
Application of metal-cutting theory using single- and multiple-point cutting tools, basic metal removal process of toolroom and production machines. Experience on conventional milling machines, shapers, lathes, surface grinders, and drill presses. Three hours of laboratory a week.

MFG 204. Materials & Processes. 3 Hours
Chemical and physical properties of metals, ceramics, and polymers; casting processes; powdered metallurgy; metal forming; plastics processes. Oral and written presentation of a team case study. Corequisite(s): MFG 204L.

MFG 204L. Materials & Processes Laboratory. 1 Hour
Testing of materials for tensile strength, impact and hardness properties, cooling curves and equilibrium diagram development, heat treating and hardenability curve determination, cold forming, plastics materials processing, micro polishing and metallography; visits to local industries. Three hours of laboratory a week. Corequisite(s): MFG 204.

MFG 206L. Dimensional Metrology Laboratory. 1 Hour
Theory and practice of precision measurement including the surface plate, angle and sine plates; surface texture and roundness; optical microscope and profile projector; mechanical and electronic gages; co-ordinate measuring machine; length standards and height gages; fixed and functional gages; sources of measurement error. Three hours of laboratory a week. Prerequisite(s): MCT 110L.

MFG 208L. Geometric Dimensioning & Tolerancing Laboratory. 1 Hour
Study of the use of ANSI Y14.5M-1994, the engineering standard for geometric dimensioning and tolerancing. Includes the proper use of GD&T symbols, reading and interpretation of engineering drawings, techniques for determining part adherence to design requirements and workmanship standards. Prerequisite(s): MCT 110L.

MFG 240. Manufacturing & Product Design. 3 Hours
Manufacturing planning; process planning; advanced cutting tools; workholders; power presses-blanking, forming, draw dies, fine blanking; group technology, gage, jig, and fixture design. Prerequisite(s): MCT 110L; MFG 108L, MFG 204.

MFG 400. Selected Manufacturing Topics. 1-4 Hours
Investigation and discussion of current topics in manufacturing engineering technology. May be taken more than once. Prerequisite(s): Permission of department chairperson.

MFG 424. Robotics. 3 Hours
Study of robotics including history, robot geometry, cost justification, end-effector (types, use, and design), sensors, and programming. Application of robots in industries. Robot programming and operation projects and end-effector design projects. Prerequisite(s): MCT 220, MCT 313.

MFG 427. Computer Integrated Manufacturing & Global Manufacturing. 3 Hours
Computer Integrated Manufacturing (CIM) systems and interrelationships; group technology, computer-aided process planning, expert systems, local area networks, automated flow lines, data collection, and material handling. Also covered are global manufacturing issues and specific country concerns. Prerequisite(s): MFG 204, SET 153L.

MFG 431. Controls for Industrial Automation. 3 Hours
Topics include: fundamentals of digital logic, pneumatic power, electromechanical sensors and actuators, pneumatic and electrical control circuit analysis and design, industry safety and design standards, concepts of mechatronics, programmable logic controllers, and networking communications. Prerequisite(s): ECT 110; SET 153L.

MFG 432. Plastics, Composites & Nano Materials & Processes. 3 Hours
Introduction to the more common plastics, composites, and nano engineering materials and their properties. Study of processes including extrusion, injection molding, blow molding, compression and transfer molding, and forming. Topics on part and tooling design. Prerequisite(s): CHM 123; MFG 204.

MFG 434. Robotics & Computer Numerical Control. 3 Hours
Programming of CNC turning and machining centers and industrial robots; application of CAM software to design and edit CNC and robot programs, edit programs, and display tool and motion paths. Parametric part programming concepts to produce complex surfaces. Programming of robotic devices. Prerequisite(s): MCT 110L; MFG 108L; SET 153L.

MFG 435. Advanced Numerical Control. 3 Hours
Instruction in the programming of complex, multi-axis CNC machines. Extended parametric programming. Programming language techniques. Prerequisite(s): MFG 434.

MFG 438. Sustainable Manufacturing & Product Design. 3 Hours
Design for the environment, sustainable manufacturing processes and business practices to support these topics are developed. Prerequisite(s): MFG 108L, MFG 204.

MFG 490. Senior Project. 3 Hours
Study and research in a specific area that integrates major elements from previous design and manufacturing process courses, culminating in individual and/or group projects, technical reports, and presentations. Prerequisite(s): CMM 100 or CMM 110 and (CMM 111 or CMM 112); IET 323; MFG 240, MFG 431; MTH 138 or MTH 168.

MFG 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

MFG 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): MFG 493.

Industrial Engineering Tech Courses

IET 230. Work Measurement. 3 Hours
Fundamentals of work simplification, motion economy, and productivity improvement using the techniques of time-and-motion study. Setting of labor standards using the techniques of stop watch, pre-determined time, standard data, and work sampling. .

IET 230L. Work Measurement Laboratory. 1 Hour
The application of real-world time-and-motion-study techniques such as operation process, worker-machine, and assembly charts. Calculations for time standards, production efficiency, line balance, cost reduction, labor, and equipment. A written and oral report on a team project. Three hours of laboratory each week. Prerequisite(s): MTH 137 Corequisite(s): IET 230.

IET 316. Quantitative Analysis. 3 Hours
Introduction of the mathematical techniques used to support decision making and managerial analysis. Probability theory, decision theory, linear programming, queuing theory, matrix algebra, differential and integral calculus, and differential equations. Prerequisite(s): MTH 138 or MTH 168; MTH 207.

IET 317. Industrial Economic & Financial Analysis. 1-3 Hours
Comparison of manufacturing or service industry projects and investments based on their economic value. Quantification of costs and benefits; analysis using present worth, annual worth, and rate of return methods. Study of simple and compound interest. Basic financial accounting concepts, including balance sheets, income statements, change of financial condition, etc. Prerequisite(s): MTH 137.

IET 318. Statistical Process Control. 3 Hours
Statistics and probability theory applied to produce control charts (x-bar, R, s, p, u, and c) to monitor processes. Interpretation and application of these charts. Problem solving techniques, Pareto analysis, and modern quality management techniques. Prerequisite(s): MTH 207.

IET 319. Quality Improvement Methods. 3 Hours
Study of problem-solving methodologies and techniques. Team development. Students will learn to use Pareto diagrams, force field analysis, cause and effect diagrams, process mapping, and other problem-solving tools. Quality costs, product liability, and ethics are also covered. Prerequisite(s): IET 318.

IET 320. Quality Assurance Techniques. 3 Hours
Students will be exposed to a variety of current quality assurance topics that companies use to improve quality, increase productivity, and reduce costs. Topics include: total preventive maintenance, quality function deployment, reliability engineering, design of experiments, and sample size selection. Prerequisite(s): IET 318; MTH 207.

IET 321. Quality Management. 3 Hours
Provides students with an understanding of managing a total quality environment to improve quality, increase productivity and reduce costs. An introduction to Deming, Juran, and others. Total Quality Management implementation strategies, requirements of ISO 9000, QS 9000, and the Malcolm Baldrige award will be covered. Prerequisite(s): IET 318; MTH 207.

IET 323. Project Management. 3 Hours
Study of the structure, techniques, and application of project management including project proposals, project plans, decision making, styles of management, and communications. Semester team project with written and oral presentations. Prerequisite(s): Junior or Senior status.

IET 332. Facilities Layout Design. 3 Hours
Design of manufacturing and service facilities for the most efficient flow of raw materials, work-in-process, and completed stock through a work place. Facilities layout, material handling, and warehousing in relation to trends toward reduced inventory, smaller lot sizes, and just-in-time. Prerequisite(s): MCT 110L.

IET 346. Six Sigma Yellow Belt. 1.5 Hour
This course is designed to facilitate skill acquisition along with clinical reasoning and decision making as it relates to the physical therapy care and management of various advanced topics including cardiopulmonary rehabilitation, women's health issues, manual therapy strategies, electrotherapeutics as well as orthopedic, neurological, and pediatric therapeutic interventions. Prerequisite(s): Successful completion of all prior course work as outlined in the University of Dayton DPT curriculum.

IET 400. Selected Topics. 1-4 Hours
Self-paced research course. Preparation of a documented written research project on an engineering technology subject. May not be taken more than once. Prerequisite(s): Permission of department chairperson.

IET 408. Lean Management Methods. 3 Hours
Study of the principles and current practices of optimizing production using Lean Management concepts. Lean Thinking, Just-in-Time, Kaizen, set-up reduction, pull systems, focused factories, standard operations, total productive maintenance, and defect-free processing methods are studied and applied. Prerequisite(s): Junior or senior status.

IET 415. Management of Global Technical Organizations. 3 Hours
Study of the structure of industrial and service organizations; study of the duties and responsibilities of a manager or supervisor in a global technical organization in developing an effective project or production team. Study of labor administration; labor legislation, current labor practices and international management.

IET 418. Cost Estimating & Control. 3 Hours
Study of the fundamentals of cost estimating of labor, material, and overhead for products, projects, operations, and systems. The concepts of internal and external cost estimating, types of costs, budgets, and profit. Semester team and individual projects, written and oral. Study of job order and process cost accounting, activity based costing, and cost-volume-profit relationships. Prerequisite(s): MTH 137 or MTH 168.

IET 420. Industrial & Environmental Safety. 3 Hours
Application of safety techniques and principles to identify and correct unsafe situations and practices. Study of system safety, failure modes and effects analysis, fault tree analysis, preliminary hazard analysis, hazardous materials and practices, OSHA, health and personal protection.

IET 423. The IET in Service Organizations. 3 Hours
Case studies, articles, guest speakers, and projects to provide insight into how industrial engineering technology skills and training can be applied to service industries including hospitals, banks, and eating and retailing establishments. Prerequisite(s): Junior or Senior status.

IET 425. Elements of Cost Control. 3 Hours
Survey of the methods of breakdown and cost analysis of labor, material, and overhead used in manufacturing and service organizations. Basic financial and cost accounting including balance sheets, income statements, change of financial condition, ratio analysis, and Activity-Based Costing. Prerequisite(s): MTH 137 or MTH 168.

IET 435. Human Factors. 3 Hours
Methods to improve the interface between humans and their environment. Human characteristics are studied to determine the best way to design the task, product, work station, or other environmental features to accommodate the human. Written and oral projects. Prerequisite(s): (Junior or senior status) or permission of instructor.

IET 446. Six Sigma Green Belt. 3 Hours
Learn, practice, and use six-sigma tools in preparation of a final certification project in a commercial business situation. Use, analyze and solve an identified business variation problem to achieve industry recognized certification.

IET 490. Senior Project. 3 Hours
Applications of IET principles to a real world project using student teams for analysis and productivity improvement. Students will manage a project, applying planning, scheduling, monitoring, and control techniques. Oral and written project proposals, status updates, and final reports presented by teams of students to the management of the sponsoring organizations. Prerequisite(s): CMM 100 or CMM 110 and (CMM 111 or CMM 112); IET 317, IET 323, IET 332, IET 408; MTH 138 or MTH 168.

IET 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

IET 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): IET 493.

Mechanical Engineering Tech Courses

MCT 110L. Technical Drawing & CAD Laboratory. 2 Hours
Technical sketching and shape description, orthographic projection theory, multi-view drawings, necessary views, sectional views, working and shop drawings, dimensioning practices, tolerancing, thread and fastener representation and nomenclature, assembly and detail drawings. Six hours of laboratory a week using instruments and commercial computer-aided design (CAD) software.

MCT 111L. Introduction to Design Laboratory. 2 Hours
Advanced topics of Computer Aided Design using three-dimensional, parametric, solid modeling software. Laboratory assignments involving the CAD software are completed through a series of individual and team design projects. Introduction to design requirements, conceptualization, and design decisions. Computer drafting topics such as ANSIY 14.5M-1994 geometric dimensioning and tolerancing standards, weld symbols, machining and surface finish symbols. Blueprint reading. Prerequisite(s): MCT 110L or MEE 104L and MEE 227L.

MCT 220. Statics & Dynamics. 3 Hours
Study of forces on bodies at rest and in motion using Newton¿¿s three laws of motion. Vectors, force systems, components, reactions, resultants, free body diagrams, equilibrium, centroids, moment of inertia, kinetics, and kinematics. Corequisite(s): MTH 137 or MTH 168.

MCT 221. Strength of Materials. 3 Hours
Analysis and design of load-carrying members, considering stress, strain, and deflection. Study of direct tension, compression, and shear; torsion; shear and moment diagrams; bending; combined stress; analysis of columns; pressure vessels. Prerequisite(s): MCT 220; MFG 204, MFG 204L; MTH 137 or MTH 168.

MCT 231. Fluid Mechanics. 3 Hours
Fluid properties, fluid statics including manometry, submerged surfaces, buoyancy and stability of floating bodies. The principles of fluid flow including Bernoulli's and energy equations, energy losses, and pump power. Analysis and design of pipe line systems and open channels; pump selection. Prerequisite(s): MTH 137 or MTH 168.

MCT 313. Industrial Mechanisms. 3 Hours
Design and analysis of linkages and cams. Graphical solutions to kinematics problems including the concepts of instantaneous motion and relative motion. Development and analysis of motion diagrams. Study of geometric features of gears and gear transmission systems. Prerequisite(s): MCT 110L, MCT 220; MTH 137 or MTH168.

MCT 317. Machine Dynamics. 3 Hours
Principles of applied engineering mechanics as they relate to machines; static force analysis in both 2 and 3 dimensional systems, kinetics of machine components by the methods of force-mass-acceleration, work-energy, and impulse-momentum; machine balancing; introduction to mechanical vibrations. Prerequisite(s): MCT 111L, MCT 313; MTH 138 or MTH 168; SET 153L.

MCT 330. Design of Machine Elements. 3 Hours
Analytical design techniques used to evaluate machine elements; stress analysis, working stress, failure theories, fatigue failure; design methods for spur gears, shafts, keys and couplings, roller and journal bearings, and springs. Original design project. Prerequisite(s): MCT 111L, MCT 221, MFG 208L.

MCT 336. Fluid Power. 3 Hours
Study of hydraulic and pneumatic fluid power components and systems used in industrial, mobile, and aerospace applications; standard symbols in circuit design; circuit analysis; specification for pumps, valves, cylinders, and circuits; hydraulic fluids; filtration; electric motors; system efficiencies; proportional control and electrohydraulic servo control systems; seals; fluid conductors; pneumatic components and systems. Library research project. Corequisite(s): MCT 336L.

MCT 336L. Fluid Power Laboratory. 1 Hour
To accompany MCT 336. Evaluation of fluid power components: pressure, flow, RPM, sound level, current, voltage, power, torque, and time. Graphical design, computational analysis, assembly, and testing of typical circuits and systems. Testing of hydraulic fluids for viscosity, pour point, flash and fire point, specific gravity. Three hours of laboratory a week. Corequisite(s): MCT 336.

MCT 342. Thermodynamics. 3 Hours
Energy analysis of engineering systems using the concepts and laws of thermodynamics. The principle of the mechanical equivalent of heat, behavior of pure substances, use of thermodynamic property tables, and study of gas mixtures. Application of the Carnot cycle to both heat engines and reversed heat engines. Prerequisite(s): MCT 231; MTH 138 or MTH 168; SET 153L.

MCT 400. Selected Mechanical Topics. 1-4 Hours
Investigations and discussion of cur-rent technical topics in mechanical engineering technology. Research report. May be taken more than once. Prerequisite(s): Permission of department chairperson.

MCT 423. Product Development. 3 Hours
Synthesis of mechanical devices and systems. Emphasis on the integration of various machine elements into a single unit. Activities include design, scheduling, budgeting, purchasing, fabrication, assembly and performance testing of an original team project. Prerequisite(s): MCT 330.

MCT 430. Design of Fluid Power Systems. 3 Hours
Energy efficiency; pressure drop determinations, variable volume pressure-compensated pumps, accumulators, proportional and electrohydraulic valves, cylinder design, hydraulic motor selection; circuit design, open and closed loop systems, power unit design; sizing of electric motors; use of industrial data and National Fluid Power Assn.-JIC design standards. Individual design project. Prerequisite(s): MCT 336.

MCT 432. Heat Power. 3 Hours
Applications of the principles of thermodynamic cycles. Analysis of energy transfer systems such as internal combustion and gas turbine engines. Power generation through steam cycles including reheat and regenerative cycles. Reversed heat engine cycles and vapor compression cycles used in heating and cooling. Prerequisite(s): MCT 342; SET 153L.

MCT 438. Heat Transfer. 3 Hours
The principles of conduction, convection, and thermal radiation energy transfer. Conduction through series and parallel walls, pipes, and containers. Forced and free convection through films, thermal radiation of energy between surfaces, and the overall transfer of heat. Prerequisite(s): MCT 231; SET 153L.

MCT 440. Applied Vibrations. 3 Hours
Free and forced vibration of single degree of freedom systems with and without damping. Industrial applications including reciprocating and rotating machinery, balancing, isolation, and noise reduction. Demonstrations of vibration sensors and instrumentation. Prerequisite(s): MCT 317; SET 153L.

MCT 445. Experimental Mechanics. 3 Hours
The selection, application, and use of strain gages and strain gage rosettes. Transformation of stress and strain. Advanced mechanics of materials topics with empirical verification of theoretical predictions. Prerequisite(s): MCT 221. Corequisite(s): MCT 445L.

MCT 445L. Experimental Mechanics Laboratory. 1 Hour
Installation of strain gauge rosettes. Experiments to determine the state of strain and stress in structures using strain gauges, photoelasticity, and brittle coatings. Vibration measurement using strain gauges, accelerometers, and motion transducers. Written and oral reports. Corequisite(s): MCT 445.

MCT 446. Applied Finite Element Modeling. 3 Hours
Introduction to the fundamentals of structural finite element modeling. Geometry creation, element types, material specification, problem solution and results postprocessing. A focus is placed on modeling techniques using commercially available software. Prerequisite(s): MCT 221; SET 153L.

MCT 456. Automotive Powertrain & Chassis Systems. 3 Hours
Theory and design of engines, transmissions, suspension, and chassis systems. Overview of manufacturing and commercial aspects of the automotive industry. Prerequisite(s): EGR 201 or MCT 220.

MCT 490. Mechanical Engineering Technology Senior Project. 3 Hours
Bringing together analytical and graphical techniques from previous courses to accomplish the design of a complete mechanism, machine, or mechanical system. Conceptual, preliminary, and final design. Prototyping and evaluation of an original team project. Written and oral reports. Prerequisite(s): CMM 100 or CMM 110 and (CMM 111 or CMM 112); IET 323; MCT 317, MCT 330; MTH 138 or MTH 168.

MCT 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

MCT 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): MCT 493.

Mechanical and Aerospace Engineering

Major:

- Bachelor of Mechanical Engineering

Concentrations:

- Aerospace Engineering
- Energy Systems-Mechanical

Minors:

- Aerospace Engineering
- Mechanical Systems

Mechanical engineers apply principles of motion, energy, force, materials, and mathematics to design and analyze a wide variety of products and systems. The field requires an understanding of core concepts including mechanics, kinematics, thermodynamics, heat transfer, materials science, and controls. Mechanical engineers use these core principles along with tools like computer-aided engineering and product life cycle management to design and analyze manufacturing plants, industrial equipment and machinery, heating and cooling systems, automotive systems, aircrafts, robotics, medical devices, and more. Today, mechanical engineers are pursuing developments in such fields as composites, mechatronics, and nanotechnology, and are helping to create a more sustainable future.

The mechanical engineering curriculum serves as a broad-based education for positions in these diverse fields or for graduate study leading to advanced degrees. The first part of the mechanical engineering curriculum provides a firm foundation in mathematics, physics, chemistry, computer-aided drawing and conceptual design, and the humanities. The second part of the curriculum provides the engineering science fundamentals and laboratory experiences necessary for testing and design, as well as continued learning in the humanities, arts, and social sciences. The final part of the curriculum emphasizes synthesis of knowledge through major design projects. The curriculum includes sufficient elective courses to permit a concentration in aerospace, energy systems, and engineering as well as minors in several other areas.

The education experience, guided by the University of Dayton Catholic and Marianist heritage, seeks to prepare graduates who will:

- have the ability to apply mathematics, science, and engineering fundamentals and computational tools to design components, systems and/or processes
- have the ability to design and conduct experiments and analyze and interpret data
- have the ability to communicate their ideas/solutions effectively
- serve as effective team members and leaders
- understand the social, environmental and economic impact of engineering in a global context
- be able to think critically about contemporary issues
- continue their personal and professional development by engaging in lifelong learning
- integrate ethical action, integrity, and service into their profession and lives

Faculty

J. Kelly Kissock, Chairperson
Professors Emeriti: Chuang, Doepker, Doyle, Eastep, Eimermacher, Schauer
Professors: Altman, Ervin, Hallinan, Jain, Kashani, Kissock, Murray
Associate Professors: Bigelow, Petrykowski, Pinnell
Assistant Professors: Choi, Hall, Heyne, Kinney, Rumpfkeil
Lecturers: Henrick, Perkins

Bachelor of Mechanical Engineering (MEE) minimum 132 hours

Common Academic Program (CAP)		
*credit hours will vary depending on courses selected		
First-Year Humanities Commons [1]		12
HST 103	West and the World	
REL 103	Introduction to Religious and Theological Studies	
PHL 103	Intro To Philosophy	
ENG 100	Writing Seminar I [2]	
Second-Year Writing Seminar [3]		0-3
ENG 200	Writing Seminar II	
Oral Communication		3
CMM 100	Principles of Oral Communication	
Mathematics		3
Social Science		3
SSC 200	Social Science Integrated	
Arts		3
Natural Sciences [4]		7
Crossing Boundaries		variable credit
Faith Traditions		
Practical Ethical Action		
Inquiry		
Integrative		
Advanced Study		variable credit
Philosophy and/or Religious Studies		
Historical Studies		

Diversity and Social Justice	3
Major Capstone	0-3

1 Completed with ASI 110 and ASI 120.

2 Or ENG 100A and ENG 100B, or ENG 200H, by placement.

3 Completed with ENG 200H or ASI 120.

4 Must include two different disciplines and accompanying lab.

Major Requirements

CHM 123	General Chemistry	3
CHM 123L	General Chemistry Laboratory	1
or PHY 210L	General Physics Laboratory I	
CMM 100	Principles of Oral Communication	3
EGM 202	Dynamics	3
EGM 303	Mechanics II	3
EGR 100	Enrichment Workshop (2 semesters)	0
EGR 103	Engineering Innovation	2
EGR 201	Engineering Mechanics	3
EGR 202	Engineering Thermodynamics	3
EGR 203	Electrical & Electronic Circuits	3
EGR 203L	Electrical and Electronic Circuits Lab	1
ENG 100 & ENG 200	Writing Seminar I and Writing Seminar II	6
or ENG 200H	Writing Seminar II	
HST 103	The West & the World	3
or HST 198	History Scholars' Seminar	
MEE 100	Introduction to Mechanical Engineering I	0
MEE 101	Introduction to Mechanical Engineering II (2 semesters)	0
MEE 104L	Computer Graphics I	1
MEE 200	Professional Development for Sophomores I (2 semesters)	0
MEE 227L	Computer Graphics II	1
MEE 300	Professional Development for Juniors	0
MEE 308	Fluid Mechanics	3
MEE 312 & 312L	Engineering Materials I and Materials Laboratory	4
MEE 312L	Materials Laboratory	1
MEE 314	Computational Methods	3
MEE 321	Theory of Machines	3
MEE 341	Engineering Experimentation	3
MEE 400	Professional Development for Seniors	1
MEE 410 & 410L	Heat Transfer and Thermo-Fluids Laboratory	4
MEE 400 Professional Development II		1
MEE 410L	Thermo-Fluids Laboratory	1
MEE 427	Mechanical Design I	3
or MEE 425	Aerospace Design	
MEE 431L	Multidisciplinary Engineering Design Laboratory I	2
MEE 432L	Multidisciplinary Engineering Design Laboratory II	3
MEE 439	Dynamic Systems & Controls	4
or MEE 440	Flight Vehicle Performance	
MEE 460	Engineering Analysis	3
MTH 168	Analytic Geometry & Calculus I (or MTH 137/MTH 138)	4
MTH 169	Analytic Geometry & Calculus II	4
MTH 218	Analytic Geometry & Calculus III	4
MTH 219	Applied Differential Equations	3
PHL 103	Introduction to Philosophy	3
PHY 206	General Physics I - Mechanics	3
PHY 207	General Physics II - Electricity & Magnetism	3
REL 103	Introduction to Religious and Theological Studies	3
Select one course from:		3
MEE 344	Manufacturing Processes	
MEE 401	Aerodynamics	
MEE 478	Energy Efficient Manufacturing	
Electives		12
Math/Science elective [1]		3
MEE electives [1]		6
Open electives [1]		6
Total Hours		132

1 Select from list approved by the Mechanical and Aerospace Engineering Department.

Concentration in Aerospace Engineering (AEC)

This concentration is open only to mechanical engineering majors. The program provides a strong background for career specialization in the fields of aircraft and aerospace engineering.

MEE 225	Introduction to Flight	3
MEE 401	Aerodynamics	3
MEE 409	Aerospace Stuctures	3
MEE 425	Aerospace Design	3
MEE 440	Flight Vehicle Performance	4
Select one course from:		3
MEE 413	Propulsion	
Approved graduate AEE course		
Total Hours		19

Concentration in Energy Systems-Mechanical (MRS)

This concentration is open to all engineering students.

Select two courses from:		6
ASI 320	Cities & Energy	
CEE 390	Environmental Pollution Control	
CEE 434	Water & Wastewater Engineering	
ECO 435	Economics of the Environment	
PHL 321	Environmental Ethics	
PHY 220	Energy & Environmental Physics	
POL 371	Environmental Policy	
SEE 301	Global Change & Earth Systems	
SEE 401	Sustainability Research I	
Any approved Arts and Science energy/sustainability related elective		

Select four courses from:		12
MEE 413	Propulsion	
MEE 420	Energy Efficient Buildings	
MEE 456	Energy Systems Engineering	
MEE 457	Building Energy Informatics	
MEE 461	Solar Energy Engineering	
MEE 462	Geothermal Energy Engineering	
MEE 464	Sustainable Energy Systems	
MEE 471	Design of Thermal Systems	
MEE 472	Design for Environment	
MEE 473	Renewable Energy Systems	
MEE 478	Energy Efficient Manufacturing	
MEE 493	Honors Thesis	
MEE 511	Advanced Thermodynamics	
AEE 565	Fundamentals of Fuels & Combustion	
or MEE 565	Fundamentals of Fuels & Combustion	
AEE 566	Combustion Theory	
Any approved engineering energy/sustainability related elective		
Total Hours		18

Minor in Aerospace Engineering (AAE)

This minor is open to chemical, civil, and mechanical engineering majors. The program provides a strong background for career specialization in the fields of aircraft and aerospace engineering.

Select four courses from:		12
AEE 558	Computational Fluid Dynamics	
MEE 225	Introduction to Flight	
MEE 401	Aerodynamics	
MEE 409	Aerospace Stuctures	
MEE 425	Aerospace Design	
MEE 440	Flight Vehicle Performance	
MEE 413	Propulsion	
Approved AEE related elective		
Total Hours		12

Minor in Mechanical Systems (MES)

This area concentrates on the study of design and analysis as well as modeling and control of mechanical systems. The activities in this area include, but are not limited to, computer-aided design, kinematic synthesis and analysis, acoustics and structural dynamics, noise and vibrations control, system modeling and identifications, and dynamics systems and control.

Select four courses from:		12
ECE 416	Introduction to Industrial Robotic Manipulators	
ECE 545	Automatic Control	
MEE 428	Mechanical Design II	
MEE 430/530	Biomechanical Engineering	
MEE 434/537	Mechatronics	
MEE 503	Introduction to Continuum Mechanics	
MEE 519	Analytical Dynamics	
MEE 520	Theoretical Kinematics	
MEE 521	Kinematic Principles in Design	
MEE 522	Geometric Methods in Kinematics	
MEE 523	Engineering Design Optimization	
MEE 527	Automatic Control Theory	
MEE 535	Advanced Mechanical Vibrations	
MEE 545	Computational Methods for Design	
MEE 546	Finite Element Analysis I	
MEE 547	Finite Element Analysis II	
MEE 579	Computer Aided Mechanical Design	
Approved Engineering Elective		
Total Hours		12

[1] Approval of Department Chair needed.

First Year

Fall	Hours	Spring	Hours
MEE 101 (or MEE 100)	0	CMM 100	3
ENG 100 (Satisfies CAP Writing Seminar)	3	REL 103 (Satisfies CAP First Year Hummanities Commons)	3
CHM 123 (Satisfies CAP Natural Science)	3	EGR 103	2
CHM 123L (or PHY 210L)	1	PHY 206 (Satisfies CAP Natural Science)	3
EGR 100	0	MTH 169	4
PHL 103 (Satisfies CAP First-Year Hummanities Commons)	3	MEE 104L	1
HST 103 (Satisfies CAP First-Year Hummanities Commons)	3	EGR 100	0
MTH 168 (Satisfies CAP Math Requirement)	4	MEE 101 (or MEE 100)	0
	17		**16**

Second Year

Fall	Hours	Spring	Hours
ENG 200 (Satisfies CAP Second Year Writing Seminar)	3	EGM 202	3
EGR 201	3	MEE 314	3
PHY 207	3	EGR 203	3
MTH 218	4	ECE 201L	1
MEE 227L	1	MTH 219	3
EGR 202	3	SSC 200	3
MEE 200	0		
	17		**16**

Third Year

Fall	Hours	Spring	Hours
SCI/MTH Elect	3	Advanced PHL Ethics (Satisfies CAP Crossing Boundaries and Practical Ethical Action)	3
MEE 321	3	MEE 344	3
MEE 312	3	MEE 341	3
MEE 312L	1	MEE 410	3
EGM 303	3	MEE 410L	1
MEE 308	3	Open Elect	3
MEE 415	0		

MEE 300 Professional Development I for Juniors	0		
	16		**16**
Fourth Year			
Fall	**Hours**	**Spring**	**Hours**
Advanced REL (Satisfies CAP Crossing Boundaries Faith Traditions, Diversity and Social Justice)	3	Advanced HST (Satisfies CAP Crossing Boundaries)	3
Art Study (Satisfies CAP Art Study)	3	MEE 432L	3
MEE 427	3	MEE 460	3
MEE 431L	2	MEE 400	1
MEE 439	4	MEE Elect	3
MEE Elect	3	Open Elect	3
	18		**16**

Total credit hours: 132

Courses

MEE 100. Introduction to Mechanical Engineering I. 0 Hours
First semester of introduction to Mechanical Engineering. Seminars on course selection, campus policies, safety, and health. Introductions to campus services for learning, counseling, coop and job placement. Weekly meeting of first-semester, first-year mechanical engineering students. Orientation to engineering problem solving and team building through hands on applications.

MEE 101. Introduction to Mechanical Engineering II. 0 Hours
Second semester of introduction to Mechanical Engineering. Seminars on course selection, campus policies, safety, and health. Introductions to campus services for learning, counseling, coop and job placement.

MEE 104L. Computer Graphics I. 1 Hour
Fundamentals of engineering graphics and the part that graphical communication plays in engineering. Introduction to computer aided design (CAD).

MEE 198. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis, and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

MEE 200. Professional Development for Sophomores I. 0 Hours
Exposure to breadth of Mechanical Engineering and opportunities available to students including minors and concentrations, research, and student organizations. Registration required for all MEE sophomores.

MEE 201. Professional Development for Sophomores II. 0 Hours
Exposure to breadth of Mechanical Engineering and opportunities available to students including minors and concentrations, research and student organizations. Registration required for all MEE sophomores.

MEE 225. Introduction to Flight. 3 Hours
An introductory course designed to provide students with a basic understanding of the multitude of disciplines that comprise the aeronautical engineering profession. A background and brief history of flight are covered. Foundational knowledge of aerodynamics, propulsion, aerostructures, aircraft performance and aerospace vehicle design. Laboratory included. Prerequisite(s): PHY 206.

MEE 227L. Computer Graphics II. 1 Hour
Advanced engineering graphics and graphical communication in engineering; introduction to project design. Prerequisite(s): MEE 104L.

MEE 230. Introduction to Biomechanics. 3 Hours
Introduction to the field of biomechanical engineering with an emphasis on human movement. Application of engineering concepts to solve clinical, occupational, and sports biomechanics problems with a focus on experimental data analysis, kinematics, research, product design, and technical reporting. Prerequisite(s): PHY 206 or permission of instructor. Corequisite(s): EGR 201 or permission of instructor.

MEE 298. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis, and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

MEE 300. Professional Development for Juniors. 0 Hours
Presentations on contemporary mechanical engineering subjects by students, faculty, and engineers in active practice; student involvement in professional and service activities. Registration required of all MEE juniors.

MEE 308. Fluid Mechanics. 3 Hours
An introductory course in fluid mechanics. Fundamental concepts including continuity, momentum, and energy relations. Control volume analysis and differential formulations. Internal and external flows in laminar and turbulent regimes. One-dimensional compressible flows. Prerequisite(s): EGR 202. Corequisite(s): MTH 219.

MEE 312. Engineering Materials I. 3 Hours
Atomic structure, bonding, and arrangement in solids. Mechanical and physical properties of solids, phase equilibria, and processing of solids. Strengthening methods in solids, principles of material selection, and characteristics of non-ferrous alloys, polymers, ceramic composites, and construction materials. Corequisite(s): EGM 303; MEE 312L.

MEE 312L. Materials Laboratory. 1 Hour
Conducting mechanical and physical tests on solids including, but not limited to tension, compression, bending, hardness, and impact. Metallographic examination of surfaces. Test standards, data reduction, analysis, interpretation, and written and oral communication of test results. Corequisite(s): EGM 303; MEE 312.

MEE 314. Computational Methods. 3 Hours
Detailed introduction to solving engineering problems through programming in the Matlab technical computing software package. Fundamentals of algorithms, including iterative processes, arrays and logic operations. Graphing of 2D and 3D functions. Graphical user interfaces. Focus on engineering applications that utilize the mathematical techniques of linear algebra, statistics and numerical methods. Corequisite(s): MTH 219.

MEE 321. Theory of Machines. 3 Hours
Analysis and synthesis of mechanisms using analytical and computer-based techniques. Applications include cams, gears, and linkages such as four-bar, slider-crank, and quick-return mechanisms. Gear train specification and force analysis. Position, velocity, and acceleration analysis and mechanical advantage of a wide variety of linkage systems. Corequisite(s): MEE 314 (for MEE), ECE 203 (for ECE), or equivalent .

MEE 341. Engineering Experimentation. 3 Hours
Basic sensors and instrumentation, design of experiments, data acquisition and processing, and uncertainty and statistical analysis of data. Measurement of strain, motion, pressure, temperature, flow and sound. Measurement applications to engineering phenomena or systems. Course will utilize a mix of lecture, laboratory experiments, and demonstrations. Also a term project to provide design of experiment experience. Corequisite(s): EGM 303; MEE 308.

MEE 344. Manufacturing Processes. 3 Hours
Casting processes including casting defects and design of castings; metal working processes such as extrusion, forging, rolling and wire drawing; sheet metal forming; welding processes; powder metallurgy and design principles for P/M parts, metal removal processes; forming and shaping plastics and composite materials; rapid prototyping. Design principles for manufacturability. Includes laboratory. Prerequisite(s): MEE 312.

MEE 398. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis, and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

MEE 400. Professional Development for Seniors. 1 Hour
Presentations on contemporary mechanical engineering subjects by students, faculty, and engineers in active practice; student involvement in professional and service activities. Registration required of all MEE seniors.

MEE 401. Aerodynamics. 3 Hours
Fundamentals of steady and inviscid aerodynamic flows. Emphasis on force and moment determination for airfoils and finite wings. Prerequisite(s): MEE 308.

MEE 409. Aerospace Structures. 3 Hours
Structural properties of wing and fuselage sections. Nonsymmetrical bending of skin-stringer wing sections. Shear stresses in thin-walled and skin-stringer multiple-celled sections. Deflection by energy methods. Introduction to finite element stiffness method. Prerequisite(s): EGM 303.

MEE 410. Heat Transfer. 3 Hours
Fundamentals of conduction, convection, and thermal radiation energy transfer. Conduction of heat in steady and unsteady state. Principles of boundary layer theory applicable to free and forced convection heat transfer for internal and external flows. Radiation analysis with and without convection and conduction. Prerequisite(s): MEE 308.

MEE 410L. Thermo-Fluids Laboratory. 1 Hour
Hands-on opportunities for students to gain knowledge of instrumentation used for temperature, flow, heat, and pressure measurement and to visualize thermo-fluids phenomena in a rich problem solving context. Phenomena to be studied include: boundary layer and separation phenomena, internal flow characteristics, hydraulics, conduction, convection, and combustion. Corequisite(s): MEE 410.

MEE 413. Propulsion. 3 Hours
Principles of propulsive devices, aerothermodynamics, diffuser and nozzle flow, energy transfer in turbo-machinery; turbojet, turbo-fan, prop-fan engines; turbo-prop and turboshaft engines. RAM and SCRAM jet analysis and a brief introduction to related materials and air frame-propulsion interaction. Prerequisite(s): MEE 308.

MEE 415. Professional Development I. 0 Hours
Presentations on contemporary mechanical engineering subjects by students, faculty, and engineers in active practice; student involvement in professional and service activities. Registration required of all MEE juniors.

MEE 416. Professional Development II. 1 Hour
Presentations on contemporary mechanical engineering subjects by students, faculty, and engineers in active practice; student involvement in professional and service activities. Registration required of all MEE seniors.

MEE 417. Internal Combustion Engines. 3 Hours
Combustion and energy release processes. Applications to spark and compression ignition, thermal jet, rocket, and gas turbine engines. Emphasis on air pollution problems caused by internal combustion engines. Idealized and actual cycles studied in preparation for laboratory testing of I. C. engines. Prerequisite(s): EGR 202 or permission of instructor.

MEE 420. Energy Efficient Buildings. 3 Hours
Provides knowledge and skills necessary to design and operate healthier, more comfortable, more productive, and less environmentally destructive buildings. A specific design target of E/3 (typical energy use divided by three) is established as a goal. Economic, thermodynamic, and heat transfer analyses are utilized. Extensive software development. Prerequisite(s): MEE 410.

MEE 425. Aerospace Design. 3 Hours
Capstone Air Vehicle Design project that involves both individual and team-based conceptual and preliminary design and sizing. This course integrates the knowledge acquired from the disciplinary subjects already taken (aerodynamics, aerospace structures, propulsion, flight dynamics and intro to flight) in order to size an air vehicle based on a set of requirements. Prerequisite(s): (MEE 225, MEE 401) or permission of instructor. Corequisite(s): MEE 409, 431L.

MEE 427. Mechanical Design I. 3 Hours
Stress and deflection analysis of machine components; theories of failure; fatigue failure of metals. Design and analysis of mechanical components such as gears, shafts, bearings and springs. Prerequisite(s): EGM 303; MEE 321. Corequisite(s): MEE 431L.

MEE 428. Mechanical Design II. 3 Hours
Advanced topics in stress and deflection analysis; analysis and design of mechanical elements such as gears, journal and ball bearings, belts, brakes, and clutches; principles of fracture mechanics; failure analysis; machinery construction principles. Contemporary design methods and issues associated with the product development cycle. Prerequisite(s): MEE 427.

MEE 430. Biomechanical Engineering. 3 Hours
Application of engineering principles to clinical, occupational, and sports biomechanics topics. The course focuses on biomechanical analysis, particularly kinematics and kinetics of human movement, with emphasis on both research and product design.

MEE 431L. Multidisciplinary Engineering Design Laboratory I. 2 Hours
Application of engineering fundamentals to sponsored multidisciplinary-team design projects. In a combination of lecture and lab experiences, students learn the product realization process and project management. Product realization topics include idea generation, proposal development, design specifications, conceptualization and decision analysis. Project management topics include cost estimation and intellectual property management. Design projects progress to the proof of concept and prototype development stages. Prerequisite(s): MEE students: EGM 303, MEE 321, and MEE 344 ELE students: ECE 304 and ECE 314 CPE students ECE 314 and CPS 346.

MEE 432L. Multidisciplinary Engineering Design Laboratory II. 3 Hours
One hour lecture and five hours of lab per week. Detailed evaluation of the Product Realization Process focusing on conceptual design, embodiment design, final design and prototyping is taught. Analysis of the design criteria for safety, ergonomics, environment, cost and sociological impact is covered. Periodic oral and written status reports are required. The course culminates in a comprehensive written report and oral presentation. CPE majors' prerequisites: ECE 431L and (ECE 334 or ECE 340 or CPS 356) and (ECE 444 or CPS 444) ELE majors' prerequisites: ECE 431L and (ECE 333 or ECE 334 or ECE 340) and (ECE 401 or ECE 415).

MEE 433. Project Management & Innovation. 1 Hour
Introduces students and teams to project management, entrepreneurship, and innovation. Topics include project management,cost estimating, time value of money, patent law, marketing, finance, and business plan development. Prerequisite(s): Junior status.

MEE 434. Mechatronics. 3 Hours
Emphasis on the integration of sensors, micro-controllers, electromechanical actuators, and control theory in a 'smart' system for a semester long design project. Topics include: sensor signal processing, electromechanical actuator fundamentals, interfacing of sensors and actuators to micro-controllers, digital logic, and programming of micro-controllers, programmable logic controllers and programmable logic devices. Equal mix of lecture and laboratory. Prerequisite(s): ECE 323.

MEE 438. Robotics & Flexible Manufacturing. 3 Hours
Overview of industrial robots; physical configuration, operation, and programming of robots; actuators, drive mechanisms, sensors, vision systems, controls, and control methods for robots; economic considerations; and automated factory concept. Prerequisite(s): MEE 321.

MEE 439. Dynamic Systems & Controls. 4 Hours
Dynamic systems modeling with special emphasis on mechanical systems (one and two degrees of freedom). Covers both transfer function and state space modeling techniques. Analogues drawn between mechanical, electrical, fluid, and thermal physical domains. System nonlinearities and model linearization methods are discussed. Analytical solutions of linear ordinary differential equations using Laplace transformation and state space theory. Feedback control theory, including root locus and frequency response techniques. Prerequisite(s): EGM 202; MTH 219.

MEE 440. Flight Vehicle Performance. 4 Hours
This course is intended to introduce the student to the flight mechanics of aerospace vehicles. Some familiarity with aircraft performance, static stability and control is assumed, but not required. We will use modern analysis methods to develop the topical details including: 1) a study of aerodynamics involved in-flight vehicle motion to obtain an understanding of influence coefficients; 2) use of linear algebra to develop a rational approach to modeling aircraft dynamics; 3) an introduction to modern control theory methodology; and 4) problems and examples that illustrate the use of desktop computational tools currently available. Prerequisite(s): (EGM 202; MEE 401, MEE 225; MTH 219) or permission of instructor.

MEE 450. Experimental Methods in Biomechanics. 3 Hours
This course is focused on developing and applying advanced experimentation skills with a specific focus on techniques associated with the study of human movement. Emphasis on equipment and technology, data analysis and interpretation, statistical methods, and technical reporting. Prerequisite(s): MEE 341 Engineering Experimentation or permission of instructor.

MEE 456. Energy Systems Engineering. 3 Hours
This course is aimed at providing fundamental knowledge of thermodynamics, fluid mechanics, and heat transfer in context of Energy Systems Engineering. A Just-in-Time approach to learning and applying these topics will be used. Projects will anchor all class activities. In addition to providing knowledge and experience of thermodynamics, fluid mechanics, and heat transfer, this course seeks to provide students the analysis skills necessary to determine the importance of energy conversion technologies, with special emphasis on energy efficiency and renewable energy (tidal, hydroelectric, wind, solar and geothermal). Corequisite(s): MEE 410.

MEE 457. Building Energy Informatics. 3 Hours
The focus of the course is the collection and analysis of energy data sets to reduce energy consumption and/or energy demand. Students will typically utilize monthly energy data from multiple buildings, real time energy data, and building energy audit data. Students will disaggregate/aggregate data to develop energy use benchmarks, identify priority buildings/actions for energy reduction, identify problems, and estimate savings. Programming in Matlab and an introduction to sql dbase management are covered. Corequisite(s): MEE 410.

MEE 460. Engineering Analysis. 3 Hours
Case study approach to engineering problem solving. Emphasis on breaking down problems to tractable parts, modeling physical systems and selection of solution techniques. Problems related to thermal, fluid, structural, and dynamic systems. Problems typically involve solution of ordinary and partial differential equations, Fourier analysis of periodic behavior, simulation, optimization and/or statistical analysis. Analytical and numerical solution techniques, with an emphasis on selecting the most appropriate technique and understanding the limitations of the analysis. Prerequisite(s): MEE 410.

MEE 461. Solar Energy Engineering. 3 Hours
This course will cover the theory, design and application of two broad uses of solar energy: (i) direct thermal and (ii) electrical energy generation. The majority of the course will focus on thermal applications, with emphasis on system simulation and design for buildings and other systems. This course will expose students to the development and use of solar design and simulation tools. Most of the tools will be implemented in Excel and TRNSYS, but students are welcome to use other software tools such as Engineering Equation Solver, (EES) or MATLAB. Some of the class time will be devoted to demonstrate the development and use of these tools to solve homework problems. Corequisite(s): MEE 410.

MEE 462. Geothermal Energy Engineering. 3 Hours
This course will cover the theory and design of three broad uses of geothermal energy: (i) heat pump applications, (ii) direct uses, and (iii) electrical energy generation. The majority of the course will focus on heat pump applications, with emphasis on ground heat exchanger simulation and design for buildings and other systems. Closed-loop, open-loop, and hybrid geothermal heat pump systems will be examined. Heating, cooling, and electricity generating applications using hot geothermal reservoirs will also be discussed. This course will expose students to the development and use of geothermal design and simulation tools. Most of the tools will be implemented in Excel, but students are welcome to use other software tools such as Engineering Equation Solver (EES) or MATLAB. The course notes explain the development and use of these tools, which will be used to solve homework problems. Corequisite(s): MEE 410.

MEE 463. Wind Energy Engineering. 3 Hours
Introduction to wind energy engineering, including wind energy potential and its application to power generation. Topics include wind turbine components; turbine fluid dynamics and aerodynamics; turbine structures; turbine dynamics, wind turbine controls; fatigue; connection to the electric grid; maintenance; web site assessment; wind economics; and wind power legal, environmental, and ethical issues. Corequisite(s): MEE 410.

MEE 464. Sustainable Energy Systems. 3 Hours
Survey of conventional fossil-fuel and renewable energy with an emphasis on system integration. Basic concepts of climate physics will be addressed along with estimates of fossil resources. Corequisite(s): MEE 410.

MEE 471. Design of Thermal Systems. 3 Hours
This course integrates thermodynamics, heat transfer, engineering economics, and simulation and optimization techniques in a design framework. Topics include design methodology, energy analysis, heat exchanger networks, thermal-system simulation and optimization techniques.

MEE 472. Design for Environment. 3 Hours
Emphasis on design for environment over the life cycle of a product or process, including consideration of the mining, processing, manufacturing, use, and post-life stages. Course provides knowledge and experience in invention for the purpose of clean design, life cycle assessment strategies to estimate the environmental impact of products and processes, and cleaner manufacturing practices. Course includes a major design project.

MEE 473. Renewable Energy Systems. 3 Hours
Introduction to the impact of energy on the economy and environment. Engineering models of solar thermal and photovoltaic systems. Introduction to wind power. Fuel cells and renewable sources of hydrogen.

MEE 478. Energy Efficient Manufacturing. 3 Hours
This course presents a systematic approach for improving energy efficiency in the manufacturing sector. Current patterns of manufacturing energy use, the need for increased energy efficiency, and models for sustainable manufacturing are reviewed. The lean-energy paradigm is applied to identify energy efficiency opportunities in industrial, electrical, lighting, space conditioning, motor drive, compressed air, process heating, process cooling, and combined heat and power systems. Prerequisite(s): (EGR 202 or equivalent) or permision of instructor.

MEE 490. Special Topics in Mechanical & Aerospace Engineering. 3 Hours
Particular assignments to be arranged and approved by the department chairperson.

MEE 493. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program.

MEE 494. Honors Thesis. 3 Hours
Selection, design, investigation, and completion of an independent, original research study resulting in a document prepared for submission as a potential publication and a completed undergraduate thesis. Restricted to students in University Honors Program. Prerequisite(s): MEE 493.

MEE 498. Research & Innovation Laboratory. 1-6 Hours
Students participate in (1) selection and design, (2) investigation and data collection, (3) analysis, and (4) presentation of a research project. Research can include, but is not limited to, developing an experiment, collecting and analyzing data, surveying and evaluating literature, developing new tools and techniques including software, and surveying, brainstorming, and evaluating engineering solutions and engineering designs. Proposals from teams of students will be considered.

MEE 499. Special Problems in Mechanical & Aerospace Engineering. 1-6 Hours
Particular assignments to be arranged and approved by department chairperson.

Transfer Students

The engineering programs welcome transfer students from both community and senior colleges and work closely with many schools to facilitate transfers from pre-engineering programs. Students may complete the first two years of study in other accredited institutions and transfer to the University of Dayton with little or no loss of credit provided that they have followed programs similar to those prescribed by the University of Dayton School of Engineering.

A student who intends to transfer to the School of Engineering must have met the minimum of the mathematics, physics and chemistry requirements along with a minimum of 3.0 GPA to be considered for admission to the School of Engineering.

The School of Engineering has dual degree arrangements as well as curriculum agreements with Sinclair Community College and Edison Community College.