
Department of Engineering Technology

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The Department of Engineering Technology offers four-year degree programs in Engineering Technology with majors in Construction; Electronics; Electronics and Computer; and Manufacturing Engineering Technology. In addition, the Department offers a two-year (AAS) degree in Manufacturing Engineering Technology. The Department works in collaboration with regional universities to provide engineering transfer programs and a one-year architecture transfer program.

EXIT REQUIREMENTS FOR DEPARTMENT MAJORS

For all degree programs in the department of Engineering Technology, a grade of C or better in all discipline-specific majors courses, CET, ECT, EET, EGT, MET, will be required for graduation. All students, upon completion of their 2-year or 4-year degree programs, will be required to take the departmental exit examination.

ENGINEERING TECHNOLOGY

Engineering technology has been defined as that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer.

Engineering technology is oriented less toward theory and more toward practical applications. The term "engineering technician" is applied to the graduates of associate degree programs. Graduates of baccalaureate programs are called "engineering technologists."

Construction Engineering Technology

This four-year degree program prepares individuals as entry-level field construction coordinators, estimators, job schedulers, and construction management trainees. It also prepares individuals for positions related to construction document control, purchasing, equipment superintendent (renting) and quality assurance/quality control. The B.S. degree program in Construction Engineering Technology is accredited by the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology (ABET) (see Appendix D for address).

Program Educational Objectives:

BS Construction Engineering Technology (BS CET)

The program educational objectives of BS CET graduates are:

- i. Demonstrate the ability to produce and utilize design, construction, and operations documents related to building and/or heavy construction industry.
- ii. Function effectively in a group environment in the workplace through demonstration of technical and communication skills.
- iii. Understand professional, ethical, and social responsibilities.
- iv. Show respect for diversity and knowledge of contemporary professional, societal and global issues.
- v. Demonstrate a commitment to quality, timeliness, and continuous improvement.
- vi. Continue professional development through life-long learning.

Electronics Engineering Technology

Career opportunities for B.S. degree graduates of Electronic Engineering Technology include entry-level positions with computer design/testing companies and electronics instrumentation companies, telephone companies, and other companies that use electronic equipment such as automated control (microprocessor/microcomputer) systems. Graduates of this program also qualify for jobs related to operation control, testing, trouble shooting, supervision and management, marketing, technical sales and field services including installation and commissioning of equipment in plant or on site. The B.S. degree program in Electronics Engineering Technology is accredited by the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology (ABET). See Appendix D for contact information.

Program Educational Objectives:

BS Electronics Engineering Technology (BS EET)

The program educational objectives for BS EET graduates are:

- i. Demonstrate the ability to analyze, design, and implement electronic systems in one or more of the areas related to control systems, instrumentation systems, communications systems, computer systems, or power systems.
- ii. Function effectively in a group environment in the industrial workplace through demonstration of technical and communication skills.
- iii. Understand professional, ethical, and social responsibilities.
- iv. Show respect for diversity and knowledge of contemporary professional, societal and global issues.
- v. Demonstrate a commitment to quality, timeliness, and continuous

ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY

The B.S. degree in Electronics and Computer Engineering Technology focuses on studies which integrate computer software and computer hardware technology subject matter.

The B.S. in Electronics and Computer Engineering Technology degree will provide the student with an understanding of microcomputer hardware design, troubleshooting, upgrading, and maintenance as well as a moderate level of computer software programming experience. The student will also be trained in Programmable Logic Controller Functioning as well as utilization of hardware and software knowledge to enter into the field of Human/Machine Interface work. The B.S. degree study program enables the student to obtain work in the programmable controls area of the industrial sector of the economy.

Program Educational Objectives:

BS Electronics and Computer Engineering Technology (BS ECET)

The program educational objectives for BS ECET graduates are:

- i. Demonstrate the ability to analyze, design, and implement electronic systems in one or more of the areas related to control systems, instrumentation systems, communications systems, computer systems, or power systems.
- ii. Function effectively in a group environment in the industrial workplace through demonstration of technical and communication skills.
- iii. Understand professional, ethical, and social responsibilities.
- iv. Show respect for diversity and knowledge of contemporary professional, societal and global issues.
- v. Demonstrate a commitment to quality, timeliness, and continuous improvement.
- vi. Continue professional development through life-long learning.

MANUFACTURING ENGINEERING TECHNOLOGY

Manufacturing Engineering Technology is the profession in which an understanding and application of a broad range of technologies is necessary for production and control of manufacturing processes. Manufacturing includes methods of production of industrial commodities and consumer products. The manufacturing professional must be able to plan, design, and implement sequence of operations using current technologies to produce products at competitive prices. Career opportunities for two-year associate degree graduates of Manufacturing Engineering Technology include entry-level positions with industries engaged in plant design, machine and tool design, robotics and industrial automation, and computer-integrated manufacturing. Four-year B.S. degree graduates qualify for jobs related to production, productivity improvement, and process design. They also qualify for supervisory and managerial positions in plant engineering.

The Bio-Manufacturing Option in the B.S. MET program is created to meet the ever-growing demand of highly educated workforce by the bio-production and research companies in the animal health corridor. B.S. degree graduates in Bio-Manufacturing qualify for jobs related to bio-production, packaging, maintenance, design, and lab scale-up work.

Program Educational Objectives:

BS Manufacturing Engineering Technology (BS MET)

The program educational objectives for BS MET graduates are:

- i. Demonstrate the ability to analyze, design, and implement electronic systems in one or more of the areas related to control systems, instrumentation systems, communications systems, computer systems, or power systems.
- ii. Function effectively in a group environment in the industrial workplace through demonstration of technical and communication skills.
- iii. Understand professional, ethical, and social responsibilities.
- iv. Show respect for diversity and knowledge of contemporary professional, societal and global issues.
- v. Demonstrate a commitment to quality, timeliness, and continuous improvement.
- vi. Continue professional development through life-long learning.

Program Educational Objectives:

Bio-Manufacturing Option in BS MET

In addition to above objectives for BS MET program, the Bio-Manufacturing Option should prepare students to:

- i. possess basic knowledge in organic chemistry, cell biology and microbiology
- ii. familiarize with GMP, as well as governmental regulations related with bio-production.

DUAL DEGREE PROGRAM IN ENGINEERING TECHNOLOGY & ENGINEERING

Missouri Western Engineering Technology majors have the opportunity to be admitted to a dual degree program between the Missouri Western State University (MWSU) Department of Engineering Technology and The University of Missouri-Kansas City School of Computing and Engineering. This program is designed for students interested in both a B.S. in Engineering Technology and a B.S. in Engineering (Civil Engineering, Electrical and Computer Engineering, or Mechanical Engineering). Students in the program complete the first three years of study in Engineering Technology at Missouri Western State University and two additional years at the University of Missouri-Kansas City in Engineering to earn two B.S. degrees in five years. To be eligible for the dual degree option, students must complete the designated course series outline in the articulation agreement and must maintain a cumulative GPA of 3.0 or above. For more information on this dual degree opportunity, please contact the dual degree liaison in the MWSU Department of Engineering Technology.

TRANSFER PROGRAMS

Engineering

The engineering transfer program is closely coordinated with the University of Missouri-Columbia and Missouri University of Science and Technology.

The exact program followed will depend on the specialized area (civil, chemical, mechanical, electrical, etc.) and the engineering school to which the student plans to transfer. Also, many students are not prepared for calculus their first semester and special programs must be arranged. An advisor in the Department of Engineering Technology will set up a suitable program for each pre-engineering student.

Architecture

The architecture transfer program is closely coordinated with the College of Architecture and Design, Kansas State University, Manhattan, Kansas. An advisor in the Department of Engineering Technology will set up a suitable program for each pre-architecture student.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Specific requirements are as follows for the Bachelor of Science degree with the major listed.

Construction Engineering Technology

Major Requirements			<i>Credits</i>
CET	105	Methods & Materials of Construction	3
CET	254	Construction Methods & Equipment	4
CET	256	Bituminous, Concrete & Soils	3
CET	260	Mechanics of Materials	4
CET	305	Mechanical & Electrical Installations	3
CET	308	Structural Analysis	3
CET	358	Structural Steel & Wood Design	3
CET	360	Construction Management	3
CET	408	Design of Concrete and Masonry Structures	3
CET	454	Construction Estimating	4
CET	458	Soil Mechanics & Foundations	3
CET	480	Construction Planning & Scheduling	3
CET	485	Selected Topics in Construction	3
CHE	101	Introductory Chemistry	4
EGT	202	Surveying I	3
EGT	205	Computer-Aided Drafting I	3
EGT	215	Computer-Aided Drafting II	3
EGT	260	Statics	3
EGT	350	Technical Report Writing	3
EGT	356	Fluids & Hydraulics	3
EGT	370	Financial Aspects of Engineering Projects	2
MAT	116	College Algebra	3
MAT	119	Trigonometry	2
MAT	147	Applied Calculus	5
PHY	110	College Physics I	4
TOTAL			80

Electronics Engineering Technology

Major Requirements			<i>Credits</i>
CHE	101	Introductory Chemistry	4
CSC	184	Computing Concepts I	3
EET	100	Electrical Circuits I	3
EET	200	Electrical Circuits II	4

EET 202	Digital Logic	4
EET 206	Introduction to Microcomputers	4
EET 212	Introduction to Semiconductor Devices	4
EET 312	Electronic Amplifiers and Integrated Circuit	4
EET 342	Analog Communications Systems	4
EET 372	Programmable Logic Controllers	4
EET 412	Operational Amplifiers & Linear Integrated Circuits	3
EET 422	Electrical Power Technology	4
EET 452	Automation & Process Control Technology	4
EET 482	Integrated System Project	3
EGT 102	Programming for Engineering Technology	3
EGT 103	Electronics Engineering Technology Fundamentals	1
EGT 205	Computer-Aided Drafting I	3
EGT 350	Technical Report Writing	3
EGT 490	Engineering Technology Internship	1
MAT 116	College Algebra	3
MAT 119	Trigonometry	2
MAT 147	Applied Calculus	5
PHY 110	College Physics I	4
PHY 111	College Physics II	4
TOTAL		<hr/> 81

Electronics and Computer Engineering Technology

Major Requirements

		<i>Credits</i>
CHE 101	Introductory Chemistry	4
CSC 184	Computing Concepts I	3
CSC 254	Computing Concepts II	3
CSC 285	Data Structures	3
CSC 384	Microcomputer Assembly Language	3
ECT 432	Computer Hardware Troubleshooting	3
EET 100	Electrical Circuits I	3
EET 200	Electrical Circuits II	4
ECT 432	Computer Hardware Troubleshooting	3
EET 202	Digital Logic	4
EET 206	Introduction to Microcomputers	4
EET 212	Introduction to Semiconductor Devices	4
EET 312	Electronic Amplifiers and Integrated Circuit	4
EET 372	Programmable Logic Controllers	4
EET 402	Microcomputer Systems	4
EET 422	Electrical Power Technology	4
EET 452	Automation & Process Control Technology	4
EGT 102	Programming for Engineering Technology	3
EGT 103	Electronics Engineering Technology Fundamentals	1
EGT 205	Computer-Aided Drafting I	3
EGT 350	Technical Report Writing	3
MAT 116	College Algebra	3
MAT 119	Trigonometry	2
MAT 147	Applied Calculus	5
PHY 110	College Physics I	4
TOTAL		<hr/> 82

Manufacturing Engineering Technology

Major Requirements

		<i>Credits</i>
CHE 101	Introductory Chemistry	4
EGT 205	Computer-Aided Drafting I	3
EGT 215	Computer-Aided Drafting II	3

EGT 220	Engineering Materials	3
EGT 260	Statics	3
EGT 325	Machine Parts and Mechanical Design	3
EGT 350	Technical Report Writing	3
EGT 356	Fluids & Hydraulics	3
EGT 370	Financial Aspects of Engineering Projects	2
EGT 490	Engineering Technology Internship	3-4
MAT 116	College Algebra	3
MAT 119	Trigonometry	2
MAT 147	Applied Calculus	5
MET 100	Electrical Circuits for Manufacturing	3
MET 101	Electronic Instrumentation for Manufacturing	3
MET 111	Manufacturing Processes	2
MET 112	Manufacturing Methods	3
MET 221	Introduction to Automated Manufacturing	2
MET 222	CNC Machining Processes	2
MET 260	Mechanics of Materials	4
MET 372	Programmable Logic Controllers	4
MET 390	Design Projects/Industrial Internship	2-4
MET 452	Automation and Process Control Technology	4
MET 422	Electrical Power Technology	4
PHY 110	College Physics I	4
TOTAL		<hr/> 77-80

Manufacturing Engineering Technology

Bio-Manufacturing Option Major Requirements

		<i>Credits</i>
BIO 106	Principles of Cell Biology	4
BIO 205	Genetics	4
BIO 390	Microbiology	4
CHE 111	General Chemistry I	5
CHE 120	General Chemistry II	5
CHE 310	Organic Chemistry I	3
CHE 311	Organic Chemistry Laboratory I	2
EGT 205	Computer-Aided Drafting I	3
EGT 220	Engineering Materials	3
EGT 260	Statics	3
EGT 325	Machine Parts and Mechanical Design	3
EGT 340	Thermodynamics	3
EGT 356	Fluids & Hydraulics	3
EGT 490	Engineering Technology Internship	4
MAT 116	College Algebra	3
MAT 119	Trigonometry	2
MET 100	Electrical Circuits for Manufacturing	3
MET 101	Electronic Instrumentation for Manufacturing	3
MET 111	Manufacturing Processes	2
MET 112	Manufacturing Methods	3
MET 221	Introduction to Automated Manufacturing	2
MET 260	Mechanics of Materials	4
MET 372	Programmable Logic Controllers	4
MET 452	Automation and Process Control Technology	4
PHY 110	College Physics I	4
TOTAL		<hr/> 83

ASSOCIATE OF SCIENCE DEGREE CHANGE

Based on a cooperative agreement with regional two year institutions, Missouri Western State University is discontinuing three Associate of Science degree programs effective Fall 2009. Those programs include: Construction Engineering Technology (AS), Electronics Engineering Technology (AS) and Electronics and Computer Engineering Technology (AS). Students with previously declared AS majors in these three programs will be able to complete their programs of study at Missouri Western. No new students will be admitted into these AS programs. Students seeking these fields of study should consider the MWSU Bachelor of Science in Construction Engineering Technology, the Bachelor of Science in Electronics in Engineering Technology or the Bachelor of Science in Electronics and Computer Engineering Technology. Students seeking the AS degree have access to those programs through an agreement with Metropolitan Community College or North Central Missouri College.

ASSOCIATE OF APPLIED SCIENCE

DEGREE REQUIREMENTS

Specific requirements are as follows for the Associate of Applied Science degree with the major listed.

Manufacturing Engineering Technology

Degree Requirements

			<i>Credits</i>
CHE	101	Introductory Chemistry	4
EGT	205	Computer-Aided Drafting I	3
EGT	215	Computer-Aided Drafting II	3
EGT	220	Engineering Materials	3
EGT	260	Statics	3
EGT	325	Machine Parts & Mechanical Design	3
MAT	116	College Algebra	3
MAT	119	Trigonometry	2
MET	100	Electrical Circuits for Manufacturing	3
MET	101	Electronic Instrumentation for Manufacturing	3
MET	111	Manufacturing Processes	2
MET	112	Manufacturing Methods	3
MET	221	Introduction to Automated Manufacturing	2
MET	222	CNC Machining Processes	2
MET	260	Mechanics of Materials	4
MET	390	Design Projects/Industrial Internship	2-4
PHY	107	Introduction to Physics	OR
PHY	110	College Physics I	4
TOTAL			<hr style="width: 100%; border: 0.5px solid black;"/> 49-51

MINORS

Construction Management

By completing a 25-hour course sequence in construction, the students in the Department of Business can obtain a Construction Management minor. Any student who is interested in this minor is advised to contact the Chairperson of the Department of Engineering Technology.

Requirements for the Minor

			<i>Credits</i>
EGT	205	Computer-Aided Drafting I	3
CET	105	Construction Materials	3
CET	254	Construction Methods & Equipment	4
CET	256	Bituminous, Concrete & Soils	3
CET	360	Construction Management	3

CET	454	Construction Estimating	4
CET	480	Construction Planning & Scheduling	3
EGT	490	Engineering Technology Internship	2
TOTAL			<hr/> 25

Computer Technology

By completing a 22-hour course sequence in computer technology related courses, the students with a major in Computer Science or Computer Information Systems in the Department of Computer Science, Mathematics, & Physics can obtain a Computer Technology minor. Any student who is interested in this minor is advised to contact the Chairperson of the Department of Engineering Technology.

Requirements for the Minor			<i>Credits</i>
EGT	103	Electronics Engineering Technology Fundamentals	1
EGT	205	Computer-Aided Drafting I	3
EET	100	Electrical Circuits I	3
EET	202	Digital Logic	4
EET	206	Introduction to Microcomputers	4
EET	212	Introduction to Semiconductor Devices	4
ECT	362	Computer Hardware Repair	3
TOTAL			<hr/> 22

Manufacturing Technology

MWSU students not majoring in the field of Manufacturing Engineering Technology may receive a minor in Manufacturing Technology. Manufacturing is the foundation of our economy. A minor in Manufacturing Technology could be especially helpful for placement of students majoring in business, economics, computer science, physics, chemistry, art, and biology.

Requirements for the Minor			<i>Credits</i>
Select 18 credits from the following:			
EGT	205	Computer-Aided Drafting I	3
EGT	215	Computer-Aided Drafting II	3
EGT	220	Engineering Materials	3
EGT	325	Machine Parts and Mechanical Design	3
MET	100	Electrical Circuits for Manufacturing	3
MET	101	Electrical Instrumentation for Manufacturing	3
MET	111	Manufacturing Processes	2
MET	112	Manufacturing Methods	3
MET	221	Introduction to Automated Manufacturing	2
MET	222	CNC Machining Processes	2

Semester Designation

- F -- the course is offered in the fall semester
- Sp -- the course is offered in the spring semester
- Su -- the course is offered in the summer semester
- DD -- the course is offered at the discretion of the department

ENGINEERING TECHNOLOGY COURSES

Waiving of any course prerequisites requires prior departmental authorization.

EGT102 Programming for Engineering Technology (3) F, Sp. Fundamental concepts about computers and approaches to computer programming including top-down design, selection control structures (if else, switch statements), repetition control structures (while, for, and do while loops), simple data types, arrays, strings, etc. Study of a selected computer programming language. ACT composite score of 15 or higher or ACT math subscore of 20 or higher or the equivalent.

EGT 103 Electronics Engineering Technology Fundamentals (1) F, Sp. Introduction to electronics engineering technology concepts, OSHA safety, ethics, and career potentials. Study of teamwork, diversity and globalization, quality, timeliness, continuous improvement and lifelong learning.

EGT 105 Introduction to Technical Graphics (3) Sp. F. Beauty and history of technical graphics. Introduction to standards and drawing methods for technical graphic communications. Three hours lecture.

EGT 202 Surveying I (3) F. Introduction to the basic principles of plane surveying with applications to engineering and construction problems; uses laboratory periods for in-the-field applications of introductory surveying techniques. Relevant computer software will be used. Two hours lecture, three hours lab. Prerequisites: Credit or concurrent enrollment in both MAT116 and MAT119.

EGT 205 Computer-Aided Drafting I (3) F, Sp. Techniques in drafting with computer applications. Students will use a CAD software to produce mechanical, electrical and/or architectural drawings and will explore other software with their applications. The emphasis is on orthographic projections, sections, auxiliary views, dimensioning, component libraries and the applications of drafting using descriptive geometry. Two hours lecture, three hours lab.

EGT 215 Computer-Aided Drafting II (3) F, Sp. Advanced techniques in drafting with computer applications. Students expand their drafting skills by creating computer generated multi-detailed drawings using 3-D techniques. Architectural, structural, mechanical, and/or electrical applications will be discussed with emphasis in detailing, tolerances, and symbol libraries. Importing/exporting of files, customizing the CAD software, and productivity techniques will be used. Principles of drawing for residential structures using various construction materials and methods will be included. Two hours lecture, three hours lab. Prerequisite: EGT205.

EGT 220 Engineering Materials (3) F. An introduction to the relationship between structure, processing and properties of materials; including atomic structure, strain hardening and annealing, solidification, ferrous and non-ferrous alloys, ceramic materials, polymers, composite materials, behavior of materials, and protection against deterioration of materials.

EGT 225 Computer-Aided Manufacturing (3) Sp. Application of computer assistance in manufacturing process; machine process control, inventory and material handling, robotics and automated assembly, product design and part grouping in relation to total manufacturing operation. Prerequisite: EGT215.

EGT 260 Statics (3) F. Fundamentals of statics; static equilibrium; topics of study include elements of statics in two and three dimensions; laws of equilibrium applied to structures and machines. Prerequisite: MAT119.

EGT 265 Engineering Statics (3) F. Composition and resolution of forces; equilibrium of force systems; application of the principles of statics to problems, including force analyses of simple structures. Centroids; moments of inertia. Prerequisites: MAT167 and PHY210.

EGT 283 Introduction to Research Methods in Engineering Technology (1-2) DD. Introduction to basic research in engineering technology. Individual and team projects involving methods for solving engineering technology-related research problems. Prerequisite: Department chairperson's approval.

EGT 300 Dynamics (3) DD. Motion of a particle; kinetics of rigid bodies; work and energy; impulse and momentum; impact. Prerequisite: EGT265.

EGT 302 Electronic Surveying (4) Sp. Land surveying work utilizing electronic surveying equipment including but not limited to: total station with data collector, topographic surveying utilizing data collection down-loaded into software program utilizing AutoCAD for topographic contouring, utilization of collected data for microstation mapping, utilization of GPS equipment for traversing and also techniques of GIS mapping. Prerequisites: EGT202 and credit or concurrent enrollment in EGT205.

EGT 310 Environmental Regulations and Pollution Abatement Technology (3) F. Studies existing and upcoming environmental regulations and pollution abatement technology as it pertains to soil, solid waste, air, and water. Laboratory exercises include case studies at pollution abatement facilities and the degree of efficiency and effectiveness of these systems. Two hours lecture, three hours lab. Prerequisites: EGT102, CET105, and CHE104.

EGT 325 Machine Parts and Mechanical Design (3) Sp. Introduction to the design and analysis of machine elements, such as shafting, springs, screws, belts, brakes, clutches, gears, and bearings. Emphasis on materials, loads, stress, strain, deflection, and quality. Prerequisite: MET222.

EGT 340 Thermodynamics (3) Sp DD. Fluid properties, work and heat, first law, second law, entropy, applications to vapor, and ideal gas processes. Prerequisite: PHY210.

EGT 350 Technical Report Writing (3) Sp. Studies various forms of reports; includes practical projects in preparing reports of various lengths and degrees of complexity and oral presentation of report material; emphasizes clear communication of technical ideas. Prerequisite: ENG104.

EGT 356 Fluids and Hydraulics (3) Sp. Introduction to fluid mechanics including fluid statics and elementary fluid dynamics; includes energy equations of steady flow, steady flow of incompressible fluids in pipes, and open channel flow. Three hours lecture. Prerequisites: PHY110 and credit or concurrent enrollment in MAT147.

EGT 370 Financial Aspects of Engineering Projects (2) F. Principles of engineering decision making process, including simple and compound interest calculations, equivalence, present worth, uniform annual cost, rate of return, depreciation, equipment replacement, and competing projects. Prerequisite: MAT116.

EGT 450 Independent Research/Project (3-4) F, Sp. Investigation of a research problem, project, or topic on an individual conference basis. Prerequisite: Declared Engineering Technology major, a minimum of 2.5 GPA in major field, and department chairperson's approval.

EGT 490 Engineering Technology Internship (1-4) F, Sp, Su. Intended for advanced students working full-time or part-time for a company in a job related to their major, which reinforces and extends knowledge and skills. Requires periodic progress reports, supervisor evaluation and a formal final report addressing the experience and the educational benefits derived. May be repeated for a maximum of 4 credit hours. Prerequisite: Junior or Senior standing, declared Engineering Technology major, a minimum of 2.5 GPA in major field, and department chairperson's approval.

CONSTRUCTION ENGINEERING TECHNOLOGY COURSES

Waiving of any course prerequisite requires departmental authorization.

CET 105 Construction Materials (3) F. Introductory study of materials used in the construction industry. Materials are studied with regard to properties of their substances and utilization in construction.

CET 250 Introduction to Statics, Strength of Materials and Structures (4) Sp. Studies fundamentals of statics and mechanics of materials as they apply to construction processes such as statics equilibrium, axial, torsional, bending, and stress and strain analysis. Introduction to various methods used in analysis of structures such as beams, trusses and frames will be included. Three hours lecture, three hours lab. Prerequisites: MAT116 and MAT119.

CET 252 Advanced Surveying (3) Sp. Intermediate and advanced surveying techniques and procedures with applications to engineering and construction problems; includes mapping, hydrography, and photogrammetry; promotes in-the-field application of techniques. Prerequisites: EGT202, and credit or concurrent enrollment in both EGT205 and MAT127.

CET 254 Construction Methods and Equipment (4) Sp. Introduction to the basic knowledge and skills of methods of building construction including foundation, structural framing, floor, roof, and wall systems; to the acquisition, selection, and use of construction equipment; and to the reading of construction blueprint drawings and specifications. Three hours lecture, three hours lab. Prerequisite: CET105.

CET 255 Legal Aspects of Boundary Survey (3) F. Includes preparation of plats and writing of property descriptions referenced to Public Land Surveys of Subdivision of Townships and Sections. Discusses surveying and land right terminology as well as re-surveying, retracing, restoration, monumentation and dedication. Also studies selected case law. Computer programs and field trips will be utilized. Prerequisite: Credit or concurrent enrollment in EGT202.

CET 256 Bituminous, Concrete, and Soils (3) Sp. Studies the properties and engineering applications of prime materials used in structural and roadway construction, including classification, basic quality control, and construction practices used with respect to asphalt, concrete, and soils. Two hours lecture, three hours lab. Prerequisites: CET105, ACT math score of 20 or higher or the equivalent.

CET 260 Mechanics of Materials (4) Sp. Axial, torsional, bending, and combined stress and strain analysis; mechanical properties and applications for static, fatigue, creep, and impact conditions; emphasizes beam stresses and deflections, columns, and riveted and welded connections. Three hours lecture, three hours lab. Prerequisite: EGT260.

CET 265 Subdivision Planning and Layout (3) Sp. Platting of boundaries, topographic layout, planning and layout for streets, sewers and water lines. Building site surveys. Prerequisite: EGT202.

CET 290 Engineering Technology Internship (1-3) F, Sp, Su. Intended for students working full-time or part-time for a company in a job related to their major, which reinforces and extends knowledge and skills. Requires periodic progress reports, supervisor evaluation and a formal final report addressing the experience and the educational benefits derived. Prerequisite: Department chairperson's approval.

CET 305 Mechanical and Electrical Installations (3) F. Principles of water supply and treatment, plumbing, sanitation systems, heating, ventilation and air conditioning including solar energy; electrical and lighting systems, power lines, electrical code, safety and design. Use of computerized methods of preparing mechanical and electrical installations design work will be emphasized. Students will use relevant computer programs in the lab. Field trips may be arranged. Two hours lecture, three hours lab. Prerequisites: CET105, PHY110, and CHE101.

CET 308 Analysis of Structures (3) F. Introduction to various methods used in the analysis of statically determinate and indeterminate structures. Load path, load tracing, and code provisions are discussed. Three hours lecture. Prerequisite: CET260 and MAT147.

CET 358 Structural Steel and Wood Design (3) F. Introduction to elementary structural steel and wood design; design of individual members and their connections as dictated by various specifications (AISC, AITC, AASHTO, etc.). Includes computer techniques in the areas of structural analysis/design. Prerequisite: Credit or concurrent enrollment in CET308.

CET 360 Construction Management (3) F. Introduction to the construction manager concept. Roles of the contractor, superintendent, designer, owner and inspector. Project administration, project financing, costs and accounting, labor relations, bonding and insurance, and job safety. Prerequisite: CET254.

CET 362 Construction Safety (3) F. Review of existing safety requirements pertaining to Construction and Industrial Works, and discusses practices utilized to comply with these regulations. All OSHA regulations pertaining to construction as well as CFR documents are discussed. Prerequisites: CET105 and ENG104.

CET 390 Technological Projects (1-3) F, Sp, Su. Intended for the advanced student whose project would enrich the educational experience. Approval by the Department Chairperson is required at least two weeks before the end of the previous term.

CET 408 Design of Concrete and Masonry Structures (3) Sp. Introduction to the design of reinforced concrete and masonry structures. Designs are based on the current ACI codes. Prerequisite: Credit or concurrent enrollment in CET308.

CET 454 Construction Estimating (4) F. Introduction to conceptual estimating and detailed estimating in construction projects. Quantity take-off, cost estimating of material, labor, equipment, overhead, and profit. Bidding practices are also discussed. Traditional and computerized estimating techniques. Three hours lecture, three hours lab. Prerequisite: CET254.

CET 456 Construction Contracts Administration (3) DD. Emphasis is given to the interpretation and preparation of construction project documents. Subjects such as contract agreement, breach of contract, termination of agreements, materials specifications, workmanship specifications, general conditions, insurance, bonds, arbitration, and cases related to finance are discussed. Prerequisite: CET354.

CET 458 Soil Mechanics and Foundations (3) F. Studies advanced topics in the properties of soils with applications in civil engineering design and construction. Two hours lecture, three hours lab. Prerequisites: CET256 and CET260.

CET 480 Construction Planning and Scheduling (3) Sp. Principles and techniques used to plan construction and schedule project activities. Networks, bar charts, computer techniques, productivity, construction time and cost parameters. Cash flow analysis, resource planning and control, and preparation of cost-to-complete reports will be discussed. Prerequisite: CET360 and credit or concurrent enrollment in EGT370.

CET 485 Selected Topics in Construction (3) Sp. Study of selected topics, such as underground construction, underpinning, formwork and other project support requirements; evaluation and review of current practices in heavy construction. The course includes study and research in a specific area that combines major elements from previous construction engineering technology courses culminating in an integrating experience through individual and/or group projects, technical reports and presentations. Prerequisite: CET254.

CET 490 Building Codes, Standards, and Practices (3) DD. Emphasis on content of the four main U.S. Building Codes and the interpretation of these codes from the contractors perspective. Also covers code enforcement procedures used by administration offices of municipal governments. Class exercises involve the review of plans and specifications to determine code compliance. Prerequisites: CET354 and CET480.

ELECTRONICS ENGINEERING TECHNOLOGY COURSES

Waiving of any course prerequisites requires prior departmental authorization.

EET 100 Electrical Circuits I (3) F, Sp. Studies of DC circuits and electrical components, including conductors, insulators, resistors, inductors, capacitors, switches, voltage and current sources. Fundamentals of AC circuits, motors and generators, three-phase industrial power, power generation, distribution, transmission, and transformers. Includes laboratory sessions to demonstrate and reinforce understanding of these topics. Two hours lecture, three hours lab.

EET 200 Electrical Circuits II (4) Sp. Analysis of series and parallel DC networks by various methods including mesh and nodal analyses, network theorems; Thevenin's, Norton's and Superposition. Analyses of AC series and parallel networks (RL, RC & RLC circuits), j operators, phasors, reactances, phase relationships, power, network theorems, sinusoidal AC voltages, currents, impedances and admittances (RL, RC & RLC), resonance, frequency response, polyphase systems, transformers and circuit analysis applications using PSpice computer simulation program. Laboratory exercises using AC sources, dual-trace oscilloscope, frequency generator, spectrum analyzer and circuit prototyping reinforce the lecture concepts. Three hours lecture, three hours lab. Prerequisites: EGT100 and credit or concurrent enrollment in MAT119.

EET 202 Digital Logic (4) Sp. Studies of number systems, logic gates, combinational logic using Small scale (SSI) and Medium scale (MSI) integrated circuits such as TTL, CMOS and ECL, Boolean algebra, mapping, flip-flops, counters, timers, adders, comparators, decoders, encoders, multiplexers, demultiplexers, arithmetic logic units (ALU's), programmable logic devices (PLD's) and input-output devices. Three hours lecture, three hours lab. Prerequisite: EGT100.

EET 206 Introduction to Microcomputers (4) F. A study of microcomputer and microprocessor architectures, ALU's, memory devices, interfacing, communications, and software programming applications using assembly language and high-level programming language such as C/C++. Three hours lecture, three hours lab. Prerequisites: CSC184 and EET202.

EET 212 Introduction to Semiconductor Devices (4) F. Studies of basic semiconductor theory, principles, characteristic curves and applications of semiconductor devices such as various types of diodes, BJT, FET transistors and biasing, and thyristors. Circuit applications including power supply rectification and filtering, voltage regulation, clippers, clampers and amplifiers, circuit modeling and analysis using electronic circuit design and analysis software such as Electronics Work Bench and PSpice. Three hours lecture, three hours lab. Prerequisites: Credit or concurrent enrollment in both EGT200 and CHE101.

EET 290 Engineering Technology Internship (1-3) F, Sp, Su. Intended for students working full-time or part-time for a company in a job related to their major, which reinforces and extends knowledge and skills. Requires periodic progress reports, supervisor evaluation and a formal final report addressing the experience and the educational benefits derived. Prerequisite: Department chairperson's approval.

EET 312 Electronic Amplifiers and Integrated Circuit (4) Sp. A study of principles and analysis of small and large signal amplifiers circuits of classes -A, -B, and -C using BJT, FET and MOSFET transistors; amplifier coupling methods, frequency response and Bode plots; introduction to active filters and operational amplifiers with applications as signal amplifiers, comparators, summers, voltage regulators, integrators and differentiators; thyristor principles, operational amplifiers, multistage amplifiers, integrated differential and operational amplifier circuits, Op-Amp theory and applications such

as comparators, instrumentation amplifiers, signal generators, power amplifiers and active filters, D/A and A/D converters and applications. Circuit modeling programs, such as Electronics Work Bench, are used throughout the course. Three hours lecture, three hour lab. Prerequisite: EET 206 and EET212.

EET 342 Analog Communications Systems (4) F. A study of information theory, bandwidth, and noise; spectral analysis, principles and analysis of AM, FM modulation, detection, receivers, transmitters, networks, filters, antennas; principles and circuits of single-sideband communications; electromagnetic wave propagation; analog telephone systems; broadcast TV systems and transmission lines through VHF frequency. Laboratory experiences include exercises in basic analog communication circuits, and transmission and reception experiments. Three hours lecture, three hours lab. Prerequisite: EET312.

EET 372 Programmable Logic Controllers (4) Sp. Studies programmable logic controllers (PLC's); hardware components, memory structure, I/O modules, PLC ladder logic diagrams and basic programming functions, sequencing, contact and coil programming, fail-safe circuits and applications. Laboratory experiments feature hardware/software applications using industrial-grade PLC's of the major manufacturers interfaced with I/O devices for data acquisition and control experiments. Three hours lecture, three hours lab. Prerequisites: EET206 and EET212.

EET 374 Robotics Controls (4) Sp. Introduction to various types of robot anatomy and drive systems, robotics control systems and components, motion analysis, types of end-effectors, robotics sensors and machine vision. Robot classifications, geometry and path control techniques, end-of-arm tooling, gripper selection system intelligence and compliance, robot programming, safety and safeguarding considerations and operator training, acceptance and problems. Laboratory experiments focus on interfacing lab robots to I/O devices using industrial grade PLC's of the major manufacturers and programming the lab robots to perform basic tasks. Three hours lecture, three hours lab. Prerequisite: EET372.

EET 382 Electronics Fabrication (2) Sp. Students are required to construct an electronic project approved by the instructor; this includes selection of a suitable project, its design and construction, and testing of the completed project. Lab may also require construction of small projects. 5 hours lab, including discussion periods. Prerequisites: EET206 and EET312.

EET 390 Technological Projects (1-3) F, Sp, Su. Intended for the advanced student whose project would enrich the educational experience. Approval by the Department Chairperson is required at least two weeks before the end of the previous term.

EET 402 Microcomputer Systems (4) F. Advanced study in the architecture and design of modern digital computers based on the Intel 80X86 family of microprocessors; design of microprocessor-based systems, microprocessor hardware selection, memory devices, I/O interfacing, interrupts, DMA, bus systems, bus interfacing, hardware assembly and troubleshooting, including motherboard, embedded systems, power, monitor, analyzing and repairing, hardware installation and configuration, software development, high-level programming languages and operating systems. Three hours lecture, three hours lab. Prerequisites: EET206 and EET212.

EET 412 Operational Amplifiers and Linear Integrated Circuits (3) F. Advanced study of operational amplifiers, multistage amplifiers, integrated differential and operational amplifier circuits, Op-Amp theory and applications such as comparators, instrumentation amplifiers, signal generators, power amplifiers and active filters, D/A and A/D converters, and PSpice modeling program applied for circuit analysis examples. Two hours lecture, three hours lab. Prerequisites: EET312, EET372, and MAT147.

EET 422 Electrical Power Technology (4) Sp. Studies the principles and applications of various types of DC and AC generators and motors, methods of power control, using thyristor devices, solid-state AC and DC motor drives and servo mechanisms, microcontrollers control applications for motor drives, interface to programmable logic control systems, inverters, and converters; principles of three-phase power systems; transformers; generation, transmission, motors/generators, and three-phase power relationships. Three hours lecture, three hours lab. Prerequisites: EGT200 and EET212.

EET 442 Digital Communications Systems (3) Sp. Principles and methods of digital modulation including A/D and D/A converters, frequency-shift keying, frequency-division multiplexing, delta and pulse-code modulation; error detection and correction techniques; UART's and modems; integrated services digital network (ISDN); networking architecture and protocols; fiber optics and satellite communications; and microwaves. Prerequisites: EET206 and EET342.

EET 452 Automation and Process Control Technology (4) F. Studies principles of feedback control systems, compensation techniques, major types of sensors, electromechanical components and the interface between mechanics and electronics. Three hours lecture, three hours lab. Prerequisites: EET202 and EET212.

EET 472 Automatic Control Systems (4) Sp. Study of the transfer function approach and Laplace transforms to the analysis of feedback control systems in the time and frequency domains, and associated compensation techniques; concepts of block diagrams, and open- and closed-loop control systems. Laboratory exercises include PLC's and MATLAB software and associated Toolboxes. Three hours lecture, three hours lab. Prerequisites: EET372, EET452, and MAT147.

EET 482 Integrated System Project (3) Sp. Electronic design project constructed in the laboratory and/or research project on selected electronics topics or problems, on an individual conference basis. Requires a written notebook, periodic progress reports and a project final report. These support documents are to demonstrate research/design and the ability to summarize procedures, results and conclusion. One hour lecture, five hours lab. Prerequisites: EET 342, EET452, and EET412.

EET 485 Senior Seminar (2) Sp (odd-numbered years). Designed for seniors majoring in electronics engineering technology; emphasizes the development of research in the field of electronics engineering technology, selected topics for group discussion of current areas of interest, guest speakers, and the exploration of career options. Prerequisite: Senior standing and declared Engineering Technology major.

EET 490 Advanced Topics in Electronics Engineering Technology (3) DD. Selected new/emerging topics in the field of Electronics Engineering Technology. Prerequisite: Junior or Senior standing, declared Electronics Engineering major, a minimum of 2.5 GPA, and department chairperson's approval.

ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY COURSES

Waiving of any course prerequisite requires departmental authorization.

ECT 362 Computer Hardware Repair (3) Sp. Study of computer hardware assembly, and the techniques utilized for troubleshooting and repair. Two hours lecture, three hours lab. Prerequisites: EET206 and EET212.

ECT 432 Computer Hardware Troubleshooting (3) (Sp). Study of computer hardware assembly and troubleshooting, including computer hardware, motherboard, embedded systems, power, monitor, analyzing and repairing, hardware installation and configuration. Two hours lecture, three hours lab. Prerequisite: EET402.

MANUFACTURING ENGINEERING TECHNOLOGY COURSES

Waiving of any course prerequisite requires departmental authorization.

MET 100 Electrical Circuits for Manufacturing (3) F. Studies fundamentals of electricity, solution of DC and AC circuits, motors and generators, three-phase industrial power, power generation, distribution, transmission, and transformers. Includes laboratory sessions to demonstrate and reinforce understanding of these topics. Two hours lecture, three hours lab.

MET 101 Electronic Instrumentation for Manufacturing (3) Sp. Studies electronic devices used in manufacturing and control equipments, such as diodes, transistors, SCR's, triacs, and integrated circuits. Also studies electronic circuits including power supplies, amplifiers, oscillators, digital electronics, basic principles of electronic communications, and electronic control circuits. Prerequisite: MET100.

MET 111 Manufacturing Processes (2) Sp. Introduction to manufacturing engineering. OSHA safety regulations, GMP, quality control, SPC, Lean manufacturing and Six-sigma.

MET 112 Manufacturing Methods (3) Sp. Introduction to machine shop practices using hand tools, precision measuring equipment, and machine tools. Topics include metal casting and forming, machining of materials, and inspection. Operating traditional machine tools such as engine lathe, milling machines, drill presses and grinders. Two hours lecture, three hours lab.

MET 221 Introduction to Automated Manufacturing (2) F. A general survey of the various components and operations in automated manufacturing systems including material handling, robotics, tooling, inspection, and quality control. Study of PLC programming and operation. One hour lecture, two hours lab. Prerequisites: MET100 and MET101.

MET 222 CNC Machining Processes (2) F. Study and practice of CNC machining operation including setup, programming, and machine-computer interface. One hour lecture, two hours lab. Prerequisite: MET112.

MET 260 Mechanics of Materials (4) Sp. Axial, torsional, bending, and combined stress and strain analysis; mechanical properties and applications for static, fatigue, creep, and impact conditions; emphasizes beam stresses and deflections, columns, and riveted and welded connections. Three hours lecture, three hours lab. Prerequisite: EGT260.

MET 285 Topics in Manufacturing (3) DD. Study of selected topics in Manufacturing, including the evaluation and review of specific manufacturing processes and study in a given area that combines previous Manufacturing Engineering courses culminating in an integrated experience through an individual technical report and presentation. Prerequisites: MET101, MET111, and MET112.

MET 372 Programmable Logic Controllers (4) Sp. Studies programmable logic controllers (PLC's); hardware components, memory structure, I/O modules, PLC ladder logic diagrams and basic programming functions, sequencing, contact and coil programming, fail-safe circuits and applications. Laboratory experiments feature hardware/software applications using industrial-grade PLC's of the major manufacturers interfaced with I/O devices for data acquisition and control experiments. Three hours lecture, three hours lab. Prerequisite: MET221.

MET 390 Design Projects/Industrial Internship (2-4) F, Sp, Su. Analysis, development and implementation of a project or work and study in an approved position in industry to enrich educational experience. Prerequisite: Department chairperson's approval.

MET 422 Electrical Power Technology (4) Sp. Studies the principles and applications of various types of DC and AC generators and motors, methods of power control, using thyristor devices, solid-state AC and DC motor drives and servo mechanisms, microcontrollers control applications for motor drives, interface to programmable logic control systems, inverters, converters, and cycloconverters; principles of three-phase power systems; transformers; generation, transmission, motors/generators, and three phase power relationships. Three hours lecture, three hours lab. Prerequisite: MET221.

MET 452 Automation and Process Control Technology (4) F. Studies principles of feedback control systems, compensation techniques, major types of sensors, electromechanical components and the interface between mechanics and electronics. Three hours lecture, three hours lab. Prerequisite: MET372.