

ENGINEERING TECHNOLOGY

www.csupomona.edu/~et/

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The Engineering Technology department offers three TAC/ABET accredited bachelor of science degrees in engineering technology; Electronics and Computer (ECET), Construction (CET) and Engineering Technology (General - Mechanical and Manufacturing, GET). The programs have integrated curricula designed to prepare graduates for technical careers in industry.

In each degree program, emphasis is placed on application engineering principles in solving real world problems. Extensive laboratory work with industry-based problems and software constitute unique features of each program. Engineering technologists serve as members of the engineering team and engage in the management, design, production, assembly, quality control and sales activities in their respective fields.

The engineering technologist is applications-oriented, building upon a background of applied mathematics, including the concepts and applications of calculus. Utilizing applied science and technology, technologists work with engineers in utilizing applied design techniques to produce practical, workable and safe results quickly and economically; configure hardware from proven concepts; install, operate, or manage complex technical systems, and/or provide customer engineering support.

High school graduates and community college transfer students with an aptitude in algebra, trigonometry, and the physical sciences, along with an interest in applications of new technology, are encouraged to apply to the program. Students desiring to major in Engineering Technology should have a capacity for science and mathematics, and incoming freshmen should have taken college preparatory courses in these disciplines in high school. Typical incoming transfer students should have completed college algebra and trigonometry and two quarters of college physics (with laboratory) prior to beginning the program at Cal Poly Pomona. All students should contact a program advisor to obtain assistance in developing their educational goals prior to actually starting their coursework. Each student will work with an advisor to coordinate a specific program of study. A minimum of 198 quarter units is required to complete the degree.

The department's programs are oriented to help students achieve competency in applying current methods and design procedures developed by engineers to solve practical technical problems commonly found in industry. Included in each program is instruction in applied sciences, computer-aided drafting (CAD), computer usage, oral and written communications, design and manufacturing processes, and the impact of technology within a broader societal context.

The faculty of the department is committed to helping students develop a strong sense of professionalism, high ethical standards and the pride that comes from accomplishment through technical competence. The department is also committed to helping students develop sound work habits, including neatness, completeness, and timeliness; to communicate effectively in written, oral, graphical, and mathematical form; and to be responsible for their own actions and inactions. The faculty is committed to academic excellence and professional integrity.

The Engineering Technology Department currently offers three degrees, and an incoming student will select from the following choices:

CONSTRUCTION ENGINEERING TECHNOLOGY (CET)

The Construction Engineering Technology Program is accredited by the Technology Accreditation Commission of ABET. This degree provides the student with a firm background in construction practices. Graduates may eventually work in any area of construction including commercial, heavy-civil, and residential. Construction Engineering Technology (CET) graduates work with owners, developers, architects, engineers (civil, mechanical, and electrical), building departments, governmental agencies, contractors, and subcontractors to implement a variety of construction projects. Job titles include field engineer, project engineer, superintendent, as well as estimator, scheduler, and project manager.

Students receive training in construction materials, drafting, computer applications, construction surveying, structural design, construction equipment, estimating, scheduling, accounting, project management, safety and law.

The program has close ties with the construction industry. The student organization is the Construction Engineering and Management Association (CEMA), which is associated with the Associated General Contractors (AGC), Building Industry Association (BIA), and Construction Management Association of America (CMAA). The CET program offers a number of construction scholarships, and students may apply for grants based on financial need and/or academic achievement. Additional information on the CET program can be found on the web at www.csupomona.edu/cet/

ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY (ECET)

The Electronics and Computer Engineering Technology program is accredited by the Technology Accreditation Commission of ABET. In today's complex world, electronics, computers, and communications permeate every facet of our lives, and will do even more so in the future. This growth can provide exciting, challenging, and rewarding career opportunities for forward-looking students in Electronics and Computer Engineering Technology.

This program is an integrated four-year curriculum designed to prepare graduates for entry into industry as electronic engineering technologists. The lower division mathematics, science, and electrical and electronics coursework is designed to provide a strong foundation for the upper-division program. The upper-division coursework emphasizes analog and digital electronics, computer hardware and software, networks, communications and control electronics. The program stresses the use of established electronic engineering analysis and design principles and applications for the solution of day-to-day technical problems currently found in industry. Graduates become members of the engineering team involved in the realization of technical projects. Typical roles are in Systems Engineering positions with an emphasis in product verification (test) and validation (application). www.csupomona.edu/ecet/

ENGINEERING TECHNOLOGY GENERAL (MECHANICAL/MANUFACTURING)

The Engineering Technology program is accredited by the Technology Accreditation Commission of ABET.

The ET major stresses the application and design of mechanical and thermal power systems utilizing strength of materials, metallurgy, statics, dynamics, fluid mechanics, thermodynamics and heat transfer principles. Graduates may be involved in applied design, analysis, application, or production of mechanical/thermo-fluid systems.

The program also offers courses with a manufacturing emphasis which stresses technological competency and managerial skills in the economical utilization of raw material and resources through planning, selection, and organization of manufacturing processes. Graduates may be involved in mass production, tooling, selection of machines, and the marketing of manufactured goods. www.csupomona.edu/etg/

Note: A 2.0 GPA is required in core courses to receive a degree in all Engineering Technology majors.

CORE COURSES FOR CONSTRUCTION ENGINEERING TECHNOLOGY (88 units)

Intro. to Construction Engineering Technology **	ETC	101	(3)
Construction Drafting/Lab	ETC	130/L	(2/1)
Construction Surveying I/Lab***	ETC	131/L	(2/2)
Construction Surveying II/Lab	ETC	132/L	(2/2)
Construction Drafting II/Lab	ETC	140/L	(2/1)
Construction Materials	ETC	202	(3)
Construction Inspection	ETC	204	(3)
Construction Plans and Specifications/Lab	ETC	230/L	(1/2)
Advanced Computer Appl. & E-construction/Lab	ETC	250/L	(3/1)
Electrical Installations/Lab	ETC	270/L	(3/1)
Construction Accounting/Lab	ETC	279/L	(2/1)
Construction Estimating I	ETC	304	(4)
Construction Estimating II	ETC	305	(4)
Structural Theory	ETC	311	(3)
Construction Equipment and Methods	ETC	312	(3)
Timber and Formwork Design	ETC	315	(4)
Steel Design	ETC	316	(3)
Concrete and Masonry Design	ETC	317	(3)
Construction Cost Control	ETC	401	(3)
Contracts and Specifications	ETC	402	(3)
Construction Safety	ETC	403	(3)
Construction Planning and Scheduling	ETC	405	(3)
Construction Organization and Management	ETC	406	(3)
Foundations and Soil Mechanics/Lab	ETC	411/L	(3/1)
Concrete Mix Design/Lab	ETC	431/L	(1/1)
Undergraduate Seminar	ETT	460	(2)
Senior Project I	ETT	461	(2)
Senior Project II	ETT	462	(2)

** ETT 101/L may be substituted for ETC 101

***CE 134/L may be substituted for ETC 131/L

SUPPORT COURSES FOR CONSTRUCTION ET (42 units)

The following major support courses should be used to satisfy the indicated GE requirements. If these courses are not used to satisfy GE, the total units to degree may be more than 198 units.

Applied Statics	ETT	210	(3)
Strength of Materials for ET/Lab	ETT	220/L	(3/1)
Engineering Economic Analysis	ETT	305	(4)
Applied Fluid Mechanics/Lab	ETT	310/L	(3/1)
Technical Electives (consult department advisor)			(12)
College Physics	PHY	122/L	(3/1)
College Physics	PHY	123/L	(3/1)
General Chemistry	CHM	121	(3)
Technical Calculus II	MAT	131	(4)
Technical Calculus (B1)	MAT	130	(4)
College Physics and Lab (B2)	PHY	121/L	(4)
General Chemistry Lab (B2)	CHM	121L	(1)

CORE COURSES FOR ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY MAJORS (80 units)

D-C Circuit Analysis/Lab	ETE	102/L	(3/1)
A-C Circuit Analysis/Lab	ETE	103/L	(3/1)
Semiconductor Devices and Circuits/Lab	ETE	204/L	(3/1)
Electrical Circuit Analysis/Lab	ETE	210/L	(3/1)
Introduction to Digital Logic/Lab	ETE	230/L	(3/1)
Electronic Mfg and PCB Fabrication/Lab	ETE	272/L	(3/1)
Industrial Electronics/Lab	ETE	280/L	(3/1)
Electronic Devices and Circuits/Lab	ETE	305/L	(3/1)
Applied Network Analysis/Lab	ETE	310/L	(3/1)
Applied Numerical Methods with C++/Lab	ETE	312/L	(3/1)
Digital Logic Systems/Lab	ETE	315/L	(3/1)
Communication Systems/Lab	ETE	335/L	(3/1)
Microprocessor Systems and Applications/Lab	ETE	344/L	(3/1)
Feedback Systems Technology/Lab	ETE	350/L	(3/1)
Technical Communications and Project Management for ECET/Lab	ETE	401/L	(3/1)
Electronic Test Instrumentation with LabVIEW/Lab	ETE	420/L	(3/1)
Digital Data Communications and Networks/Lab	ETE	442/L	(3/1)
Applied C Programming/Lab	ETT	215/L	(3/1)
Senior Project I	ETT	461	(2)
Senior Project II	ETT	462	(2)

SUPPORT COURSES FOR ELECTRONICS AND COMPUTER ENGINEERING TECHNOLOGY MAJORS (50 units)

The following major support courses should be used to satisfy the indicated GE requirements. If these courses are not used to satisfy GE, the total units to degree may be more than 198 units.

Computer Applications for ET/Lab	ETT	101/L	(2/1)
Applied Statics	ETT	210	(3)
Applied Dynamics	ETT	211	(3)
Material Science for ET	ETT	217	(3)
College Physics	PHY	122/L	(3/1)
College Physics	PHY	123/L	(3/1)
General Chemistry	CHM	121	(3)
Technical Calculus II	MAT	131	(4)
Technical Calculus III	MAT	132	(4)
CAD elective (typically MFE126/L)			(3)
Technical electives (consult department advisor)			(16)
Technical Calculus (B1)	MAT	130	(4)
College Physics and Lab (B2)	PHY	121/L	(4)
General Chemistry Lab (B2)	CHM	121L	(1)

CORE COURSES FOR ENGINEERING TECHNOLOGY- General (111 units)

Introduction to Engineering Technology/Lab	ETT	101/L	(2/1)
Electrical Technology/Lab	ETT	201/L	(3/1)
Applied Statics	ETT	210	(3)
Applied Dynamics	ETT	211	(3)
Applied C Programming/Lab	ETT	215/L	(3/1)
Material Science for ET	ETT	217	(3)
Strength of Materials for ET/Lab	ETT	220/L	(3/1)
Materials Joining/Lab	ETT	234/L	(1/1)
Engineering Economic Analysis for ET	ETT	305	(4)
Applied Fluid Mechanics I/Lab	ETT	310/L	(3/1)
Electronic Devices and Systems/Lab	ETT	321/L	(3/1)
Undergraduate Seminar	ETT	460	(2)
Senior Project I	ETT	461	(2)
Senior Project II	ETT	462	(2)
Applied Thermodynamics	ETM	306	(4)

Applied Heat Transfer	ETM	308	(3)
Applied Fluid Mechanics II	ETM	312	(4)
Instrumentation and Control Applications/Lab	ETM	330/L	(3/1)
Internal Combustion Engines/Lab	ETM	410/L	(3/1)
Engineering Graphics/Lab	MFE	126/L	(2/1)
Manufacturing Processes I—Material Removal/Lab	MFE	221/L	(2/1)
Engineering Graphics II/Lab	MFE	226/L	(2/1)
Manufacturing Processes II—Forming, Casting and Joining/Lab	MFE	230/L	(2/1)
Electives chosen with Department Approval			(36)

SUPPORT COURSES FOR ENGINEERING TECHNOLOGY – General (19 units)

College Physics	PHY	122/L	(3/1)
College Physics	PHY	123/L	(3/1)
General Chemistry	CHM	121	(3)
General Chemistry Lab (B2)	CHM	121L	(1)
Technical Calculus II	MAT	131	(4)
Technical Calculus III	MAT	132	(4)
Technical Calculus (B1)	MAT	130	(4)
College Physics and Lab (B2)	PHY	121/L	(4)

GENERAL EDUCATION REQUIREMENTS

An alternate pattern from that listed here for partial fulfillment of Areas 1, 3 and 4 available for students in this major is the Interdisciplinary General Education (IGE) program. Please see the description of IGE elsewhere in your catalog.

Area A (12 units)

1. Written Communication
2. Oral Communication
3. Critical Thinking

Area B (16 units)

1. Math/Quantitative Reasoning
2. Physical Science
3. Biological Science
4. Science and Technology Synthesis

Area C (16 units)

1. Fine and Performing Arts
2. Philosophy and Civilization
3. Literature and Foreign Languages
4. Humanities Synthesis

Area D (20 units)

1. U.S. History, Constitution, and American Ideals
2. History, Economics, and Political Science
3. Sociology, Anthropology, Ethnic, and Gender Studies
4. Social Science Synthesis

Area E (4 units)

Lifelong Understanding and Self-development

COURSE DESCRIPTIONS

Lecture and laboratory courses listed together are to be taken concurrently.

ET Core Courses

ETT 101/L Computer Applications for Engineering Technology/Laboratory (2/1)

Introduction to engineering technology. Use of the personal computer for engineering problem-solving, documentation, and project management using current software application packages. Independent computer projects required. 2 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: College-level math or consent of instructor.

ETT 200 Special Study for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ETT 201/L Electrical Technology/Laboratory (3/1)

Introduction to DC and AC circuit theory and applications involving resistance, inductance, and capacitance; characteristics of passive filters; operation and application of basic electrical measuring instruments. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisite: PHY 123/L. Not open to ECET majors.

ETT 210 Applied Statics (3)

Introduction to the basic concepts of mechanics, emphasizing the action of forces on rigid bodies and the response of those bodies to the applied forces. Methods for logical solutions to engineering problems are stressed. 3 lectures/problem-solving. Prerequisites: MAT 105, MAT 106, PHY 121.

ETT 211 Applied Dynamics (3)

Application of the theory of motion of rigid bodies with acceleration from applied forces. Emphasis on problems in which those bodies can be considered as non-rotating. Introduction to plane motion with rotation. Uses analytical methods. 3 lectures/problem-solving. Prerequisites: ETT 210, MAT 131.

ETT 215/L C Programming for Technology/Laboratory (3/1)

Introduction to structured programming using ANSI C. Programming problems applicable to engineering technology. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: ETT 101, college-level math.

ETT 217 Materials Science for E.T. (3)

Concepts of the structure and properties of materials and their relevance to industrial applications, properties of metals, ceramics, plastics, composites, and semiconductors. 3 lectures/problem-solving. Prerequisites: CHM 121, PHY 121.

ETT 220/L Strength of Materials for Engineering Technology/Laboratory (3/1)

Stress-strain diagrams; tensile, compressive and shear stresses; working stresses and factors of safety; torsional stress and angular deformation in circular shafts; beam analysis, shear and moment diagrams, bending stress, shear stress, and beam deflections; column analysis; bolted and riveted connections in direct shear and eccentric loading; thin-walled pressure vessels; thermal stresses; combined stresses. 3 lectures/ problem-solving and 1 three-hour laboratory. Prerequisites: ETT 210, MAT 130.

ETT 234/L Materials Joining/Laboratory (1/1)

Methods of material-joining used in modern industry as applied to metals and plastics. Introduction to evaluation methods. 1 lecture and 1 three-hour laboratory.

ETT 270, 470 Engineering Technology Internship (1-3) (1-3)

Specially assigned or approved on-the-job work activities in industry or other institutions related to student's educational program of studies. Formal report required. Prerequisites: engineering technology related employment. Advance approval by internship coordinator required via a written proposal, and a letter of intent from the sponsoring employer. Each course may be repeated once. Maximum credit limited to 12 units.

ETT 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

ETT 305 Engineering Economics Analysis for Engineering Technology (4)

Principles and techniques of economics analysis of engineering and manufacturing projects. Costs and estimation, time value of money, economic evaluation criteria, basic comparative models, and replacement analysis. Consideration of income taxes, risk, and intangibles. Research papers and independent study required. 4 lectures/problem-solving. Prerequisites: College-level math, ETT 101/L.

ETT 310/L Applied Fluid Mechanics I/Laboratory (3/1)

Properties of fluids. Applied principles of fluid flow. Pressure forces on plane and curved surfaces. Viscous flow in pipes and open channels. 3 lectures/problem-solving; 1 laboratory. Prerequisites: ETT 210, MAT 131.

ETT 321/L Electronic Devices and Systems/Laboratory (3/1)

A survey study of electronics including logic systems; PLCs; motors; amplifiers, tuned circuits, oscillators, electro-optics, computer systems and networks. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETT 201/L. Not open to ECET majors.

ETT 400 Special Study for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ETT 460 Undergraduate Seminar (2)

Seminar discussion of new developments, policies, practices and procedures. Preparation and oral presentation by each student of his/her senior project, 2 seminars per week. Preparation for FE examination. Prerequisites: senior standing in major coursework.

ETT 461, 462 Senior Project I, II (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. Minimum 120 hours total time. With advisor approval, Construction (CET) students may substitute ETC 490 for ETT 461 and ETT 462. Prerequisites: ETT 460, ETE 401, and senior standing.

ETT 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

CONSTRUCTION ET COURSES**ETC 101 Introduction to Construction Engineering Technology (3)**

An introduction to construction. An overview of the construction program, the scope of the field of construction and the responsibilities of the construction engineer. Introduction to personal computers and applications. 3 lectures/problem-solving. Prerequisite: college-level math.

ETC 130/L Construction Drafting I/Laboratory (2/1)

Engineering graphics for the development and interpretation of construction drawings. Emphasis on learning the basic tools needed to draw and visualize both two and three dimensional objects. Composition of design and construction drawings using CAD software and hand drafting. Introduction to orthographic projection, auxiliary views, dimensioning and exercises that focus on composing construction details and sections. Adherence to an acceptable CAD standard in the placement and manipulation of graphical elements. Use of a laboratory facility and standard drafting equipment to compose construction drawings. 2 lectures and 1 three-hour laboratory.

ETC 131/L Construction Surveying I/Laboratory (2/2)

Fundamental surveying methods as applied to construction layout. Use of electronic transit and automatic level for location and construction operations. Vertical and horizontal control. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: college algebra and trigonometry.

ETC 132/L Construction Surveying II/Laboratory (2/2)

Profile levels, cross-section and highway slope-staking for matrix earthwork calculations and cut/fill distribution. Horizontal and vertical highway curves. Topographic surveys, computer application land-mapping. Construction layout of buildings, roads and utilities. 2 lectures/problem-solving, 2 three-hour laboratories. Prerequisite: ETC 131/L.

ETC 140/L Construction Drafting II/Laboratory (2/1)

Engineering graphics for the development and interpretation of construction drawings. Emphasis on learning the advanced tools needed to compose and visualize both two and three dimensional design. Use of CAD software to develop 3-dimensional static and animated models depicting construction engineering design. Use of software to develop computer-aided design tools for analytical interpretation of construction projects. 2 lectures and 1 three-hour laboratory. Prerequisite: ETC 130/L.

ETC 202 Construction Materials (3)

Properties of materials used in building and heavy construction. Methods of fabrication and installation of construction materials. Introduction to industry standards and specifications. 3 lectures/problem-solving. Corequisite: ETC 230/L.

ETC 204 Construction Inspection (3)

Introduction to construction inspection, functions, responsibilities, authority and technical requirements related to construction. 3 lectures/problem-solving.

ETC 230/L Construction Plans and Specifications/Laboratory (1/2)

A study of the format, guidelines and practices of construction drawings and specifications for buildings and heavy construction. Architectural, civil, structural, mechanical, electrical, plumbing and landscape drawings. Drainage and grading plans. 1 lecture/problem-solving, 2 three-hour laboratories. Corequisite: ETC 202. Prerequisite: ETC 130 or MFE 126.

ETC 250/L Advanced Computer Applications and E-Construction/Laboratory (3/1)

Applied Construction Engineering Programming for the development of structured routines useful in the construction engineering profession. Emphasis on understanding program composition, operators and functions compiled using Visual Basic. Use of Microsoft applications to develop macros and utilities that automate formatting tasks used in construction engineering reports and proposals. Exposure to HTML code for the development of interactive Intranet/Internet sites and e-construction. 3 lectures and 1 three-hour laboratory. Prerequisite: ETC 101.

ETC 270/L Electrical Installations/Laboratory (3/1)

Fundamentals of electrical equipment and installations as related to the construction industry. Electrical wiring, transformers, machines, illumination, heating, wiring codes and specifications. 3 lecture/problem-solving and 1 three-hour laboratory. Prerequisites: college algebra and trigonometry. Not open to ECET majors.

ETC 279/L Construction Accounting/Laboratory (2/1)

Fundamentals and practices of financial and management accounting in the construction industry, including accounting processes, internal control, cost elements, overhead allocation and financial reports. 2 lectures/problem-solving and 1 three-hour laboratory. Prerequisite: ETC 202.

ETC 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination of both.

ETC 304 Construction Estimating I (4)

Fundamentals of building construction estimating procedures considering both quantity surveying and pricing of labor, materials, and equipment costs. 4 lectures/problem-solving. Prerequisites: ETC 202, ETC 230/L and MAT 130.

ETC 305 Construction Estimating II (4)

Fundamentals of heavy construction estimating procedures considering both quantity survey and pricing. 4 lectures/problem-solving. Prerequisites: ETC 131/L, ETC 304, ETC 312, MAT 131.

ETC 311 Structural Theory (3)

Introduction to structural systems used in construction projects. Design loads. Analysis of statically determinate beams, frames, and trusses for forces and deflections. Computer applications. Introduction to statically indeterminate structures using moment distribution. 3 lectures/problem-solving. Prerequisites: ETT 220, MAT 131.

ETC 312 Construction Equipment and Methods (3)

Construction procedures, job planning layout and scheduling, selection and application of construction equipment to building and heavy construction projects. 3 lectures/problem-solving. Prerequisites: ETC 202, ETC 230/L.

ETC 315 Timber and Formwork Design (4)

Properties of wood. Design loads. Design of structural elements including beams, columns, horizontal diaphragms, and shearwalls. Connection design. Application of timber design to the construction project including the design of concrete formwork and falsework for slabs, beams, columns and walls. 4 lectures/problem-solving. Prerequisites: ETC 311, MAT 131.

ETC 316 Steel Design (3)

Design of structural steel elements including tension members, columns, beams, and beam-columns using load and resistance factor design (LFRD). Design of welded and bolted connections. AISC specifications. 3 lectures/problem-solving. Prerequisite: ETC 311.

ETC 317 Concrete and Masonry Design (3)

Design of reinforced concrete and reinforced masonry structural elements, including beams, T-beams, slabs, columns, walls, retaining walls and footings. ACI specifications. Design of reinforced masonry beams, lintels, walls and retaining walls. 3 lectures/problem-solving. Prerequisite: ETC 311.

ETC 401 Construction Cost Control (3)

Methods and procedures used in planning, budgeting, scheduling and cost control related to construction projects. Methods of monitoring, trending, forecasting and appraisal of project cost via manual and computer techniques. 3 lectures/problem-solving. Prerequisite: ETC 304.

ETC 402 Contracts and Specifications (3)

Basic principles and detailed review of design drawings and contract documents, including plans, specifications and agreements involved in the construction of facilities. 3 lectures/problem-solving. Prerequisites: senior standing, ETC 202, ETC 230/L.

ETC 403 Construction Safety (3)

Logical problem-solving using safety engineering in construction, considering safety legislation, OSHA. Safety programs, accident prevention and public safety. 3 lectures. Corequisite: ETC 204.

ETC 405 Construction Planning and Scheduling (3)

Methods and procedures used in planning and scheduling construction projects using graphic charts and CPM networks. Resource allocations, leveling and cost curves. Application of manual and computer network systems. 3 lectures/problem-solving. Prerequisite: ETC 304.

ETC 406 Construction Organization and Management (3)

Theory and techniques of construction management and the general organizational structure of a contracting firm. Contractor's policies and procedures regarding the legal, financial, marketing, and personnel management as well as the everyday operations of a construction company and a project. 3 lectures/problem-solving. Prerequisite: ETC 304.

ETC 411/L Foundations and Soil Mechanics/Laboratory (3/1)

Selection and methods of installation of foundations and other soil-supported structures. Footings, piles, caissons, retaining structures, soil embankments and fills. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisite: ETT 220.

ETC 431/L Concrete Mix Design/Laboratory (1/1)

Theory and practice of concrete materials and the methods utilized in the mix design, production, placement and testing of structural concrete. 1 lecture/problem, 1 laboratory. Prerequisite: ETC 202.

ETC 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

ELECTRONICS AND COMPUTER ET COURSES**ETE 102/L D-C Circuit Analysis/Laboratory (3/1)**

Principles of electric circuit elements including resistance and DC network theorems. Capacitance, transients in RC circuits. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: MAT 105.

ETE 103/L A-C Circuit Analysis/Laboratory (3/1)

Principles of inductance and magnetism; transients in RL circuits. Phasor analysis in AC circuits; basic AC circuit theorems; transformers. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisites: C- or better in ETE 102, MAT 106.

ETE 204/L Semiconductor Devices and Circuits/Laboratory (3/1)

Characteristics and applications of solid-state diodes. Characteristics and biasing of BJT devices in CB, CE, CC amplifier configurations – load lines, input/output impedance and mid-band gain calculations. Characteristics and biasing of JFET devices and amplifiers, including load lines, input/output impedances and mid-band gain calculation. 3 lectures/ problem-solving and 1 three-hour laboratory. Prerequisite: C- or better in ETE 103.

ETE 210/L Electrical Circuit Analysis/Laboratory (3/1)

RLC circuits, transfer functions, frequency response, Bode plots, passive filters, and resonance. 3 lectures/problem-solving. 1 three-hour laboratory. Prerequisite: C- or better in ETE 103.

ETE 230/L Introduction to Digital Logic/Laboratory (3/1).

Number systems and conversions, theory and practice of fundamental and universal gates, SOP and POS interconnections and conversions, simplification theorems, applied design of MSI and LSI logic and programmable logic devices. A/D code conversions. 3 lectures/problem-solving and 1 three-hour laboratory. Computer methods utilized. Prerequisite: C- or better in ETE 204.

ETE 240/L Microcomputer Systems and Assembly Language Programming/Laboratory (3/1)

Software model and instruction set of the 68HC11 microcontroller, using the monitor for machine-language and assembly language programming, elementary I/O programming using the system timer, keypad and LCD units. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisite: C- or better in ETE 230.

ETE 272/L Electronic Manufacturing. PCB Fabrication/Laboratory (3/1).

Manufacturing and fabrication processes associated with the electronics industry. Introduction to hardware design. Testing/QA processes. PCB artwork and manufacturing techniques. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: CAD, ETE 204, 230.

ETE 280/L Industrial Electronics/Laboratory (3/1)

Modern industrial electronics and control devices - relays, contactors, DC and AC motors; stepper motors; three-phase power and its control, optoelectronic devices, SCRs, Triacs and other thyristor devices; PLCs and ladder diagrams; introduction to control systems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 204, 210, 230.

ETE 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

ETE 305/L Electronic Devices and Circuits/Laboratory (3/1)

Frequency dependent models for BJT and FET amplifiers, frequency effects upon gain and input-output impedance of single and multistage BJT and FET amplifiers, Bode plots, differential amplifiers. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 204, 210, MAT 131.

ETE 310/L Applied Network Analysis/Laboratory (3/1)

Analysis of circuits in the time and frequency domains employing Laplace transforms methods. Ideal op-amps and applications. Second order passive and active circuits, circuit responses to a variety of input signals, stability analysis of closed loop systems. Computer methods utilized. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETE 210; MAT 131.

ETE 312/L Advanced Programming with C++/Laboratory (3/1)

Introduction to C++ including console input/output, file input/output, function overloading, class structures, arrays, composition, single and multiple inheritance, virtual functions; and techniques for building class libraries. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETT 215.

ETE 315/L Digital Logic Systems/Laboratory (3/1).

Introduction to sequential logic circuits, latches and flip-flops and their applications, state diagram, state table, state machines (Mealy and Moore) design, state machine converter, state machine with and without control inputs, state reduction, analysis and design of clocked sequential circuits, analysis of timing diagrams, complex sequential logic circuit design and serial data code conversion, state machine design with algorithmic state machines. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 230, ETT 215.

ETE 318/L Linear Integrated Circuits/Laboratory (3/1).

Op-amp applications including integrators and differentiators; active filters, Schmitt triggers, oscillators, and wave shaping circuits. Op-amp characteristics. DC offsets and compensation; slew-rate limiting; open and closed-loop bandwidth, stability and compensation. 3 lectures/problem solving and 1 three-hour laboratory. Prerequisites: ETE 305, 310.

ETE 335/L Communication Systems/Laboratory (3/1)

Introduction to periodically gated, amplitude, single sideband, frequency and phase modulation methods involved in communications systems. Introduction to digital modulation communication techniques. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 305, 310, MAT 132.

ETE 344/L Microcontroller Systems and Applications/Laboratory (3/1)

Microprocessor/microcontroller organization, operation, assembly-language programming and input/output applications. A/D conversions and real-time interrupts. 3 lecture problems. 1 three-hour laboratory. Prerequisites: ETE 240, ETT 215.

ETE 350/L Feedback Systems Technology/Laboratory (3/1)

Modeling of continuous systems in the time and frequency domains, block diagrams, first and second order system response, reduction of multiple subsystems, feedback control systems, transient response, steady state behavior of feedback systems, sensitivity, stability analysis using Routh-Hurwitz and root locus techniques. Sample systems include servo motors and phase-locked loops. Computer methods utilized. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 272, 305, 310, MAT 132.

ETE 401/L Technical Communications and Project Management for ET/Laboratory (3/1)

Writing and interpreting engineering information related to electronics—research papers, technical and senior project proposals, engineering specifications, oral reports; project management techniques and use of project management software. Computer methods utilized. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: Satisfaction of GWT, ETE 272, 305, 310, 344.

ETE 412/L Introduction to Windows Programming/Laboratory (3/1)

Introduction to Windows application programming using API functions—menus, controls; use of class libraries. 3 lecture problems and 1 three-hour laboratory. Prerequisite: ETE 312 or equivalent.

ETE 414/L Linear Amplifier Circuits/Laboratory (3/1)

Analysis of multistage and large signal amplifiers. Frequency response. Ideal and non-ideal negative feedback amplifiers and their characteristics. Oscillators. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 305, 310.

ETE 420/L Electronic Test Instrumentation with Lab VIEW/Laboratory (3/1)

Fundamentals of electronic test instrumentation and computer data acquisition systems, theory and function of electronic measurements, op-amp applications and signal conditioning, sensors applications such as strain gage and temperature. Computerized data acquisition and programmable instrument control (IEEE - 488) utilizing LabVIEW graphical programming software. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 305, 310.

ETE 437/L RF Measurements/Laboratory (3/1)

Electronic measurement equipment and techniques for measurements at radio frequencies of such quantities as power, impedance, standing wave ratio, frequency, voltage and current, Smith Charts, impedance matching, Network Analyzer usage and measurements. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 335.

ETE 438/L Microwave and RF Systems/Laboratory (3/1)

Microwave and RF measurement systems and techniques. Passive and active high frequency discrete circuit design. Microwave safety, generation, transmission, waveguides, waveguide components. Survey of modern microwave applications: radar, terrestrial and satellite communication systems. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 437.

ETE 442/L Data Communications and Networking/Laboratory (3/1)

Signal conversion methods, sampling, quantization, pulse modulation techniques, error analysis methods, digital modulation techniques, encoding schemes, data transmission methods, open system interconnection model, local area networks, transmission control protocol, internet protocol (TCP/IP), ethernet, IEEE 802 networking technology. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 335.

ETE 445/L PC-based Microprocessor Systems/Laboratory (3/1)

Organization, software model, and assembly-language programming of the 80xxx family of personal computers—applications, input/output programming, interrupts, use of the macro assembler. 3 lecture problems. 1 three-hour laboratory. Prerequisites: ETE 344.

ETE 446/L Switching Circuits and Devices/Laboratory (3/1)

Analysis of circuits operating in a switched mode. Waveshaping, timing, and logic families. Special devices, A-D and D-A converters. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETE 305, 310.

ETE 450/L DSP and Digital Control Systems/Laboratory (3/1)

Introduction to digital signal processing, sampling techniques; zero-order hold circuits, z-transforms and difference equations; digital controllers; digital filters, frequency and phase response; applications of digital controllers (DID) in closed-loop feedback systems. 3 lecture problems and 1 three-hour laboratory. Prerequisites: ETT 215, ETE 350, 344.

ETE 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

Engineering Technology Major Courses:**ETM 299/299A/299L Special Topics for Lower Division Students (1-4)**

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

ETM 306 Applied Thermodynamics (4)

Applications of fundamental concepts of work, heat, energy. Basic power and refrigeration cycles, and reciprocating machines. First and second law of thermodynamics as applied by the engineering technologist. Use of generalized charts and handbooks in solving thermodynamic problems. 4 lectures/problem-solving. Prerequisites: ETT 211, ETT 310, MAT 131.

ETM 308 Applied Heat Transfer (3)

Application of basic principles governing the three modes of heat transfer: conduction, convection and radiation. Empirical and practical relations for forced convection heat transfer and heat exchanger analysis and design 3 lectures/problem-solving. Prerequisites: ETM 306, ETM 312, ETT 310, MAT 132.

ETM 312 Applied Fluid Mechanics II (4)

Introduction to fluids in motion, differential and integral forms of governing equations, non-dimensional analysis and similitude; laminar and turbulent flow; gas dynamics. 4 lecture problems. Prerequisites: ETT 310, ETM 306.

ETM 315/L Machine Elements/Laboratory (3/1)

Practical application of the fundamentals of mechanics and strength of materials to the design of machine elements with emphasis on computer-aided design solution-problems. 3 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: ETT 220; PHY 121, MFE 126/L.

ETM 320/L Power Transmission Systems/Laboratory (3/1)

Introduction to the elements of power transmission systems, including shafting, couplings, belts, chains, gears, clutches, fluid couplings and fluid pumps and motors. Theory and operation of power transmission systems composed of above elements. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETM 315.

ETM 324/L Applied Mechanisms/Laboratory (3/1)

A study of the elements of mechanisms; cams, gears, kinematics. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETT 211, MAT 131, PHY 121.

ETM 330/L Instrumentation and Control Applications/Laboratory (3/1)

Theory of application of strain gages, pressure gages, and other transducer types for instrumentation and control of electromechanical systems. This will include velocity, displacement, frequency and time response. Prerequisites: MAT 132, ETT 321, ETM 306, ETT 310.

ETM 334 Applied Heating and Air Conditioning (4)

Thermal environmental requirements for human habitation. Psychometrics. Building heating and cooling loads. Air-handling equipment. 4 lectures/problem-solving. Prerequisites: ETM 306, ETT 310.

ETM 335/L Heating and Air Conditioning/Laboratory (3/1)

Heating equipment; refrigeration systems and equipment. Design of a complete system of compatible components for the control of thermal environment. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETM 334.

ETM 405L Wind Tunnel Testing Laboratory (2)

Low speed wind tunnel testing of bodies of various shapes, such as automobiles, bridges, and buildings, etc., to experimentally determine their aerodynamic drag and lift characteristics. 2 three-hour laboratories. ETM 306, 312.

ETM 410/L Internal Combustion Engines/Laboratory (3/1)

Theory and performance of internal combustion engines—compression, carburetion, fuel injection, ignition, and cooling; power takeoff, use of instrumentation. Selection and rating of fuels. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: ETM 306, 312.

ETM 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

ETP 276/L Production Control/Laboratory (3/1)

Principles of planning and controlling production activities; product development, forecasting, scheduling and loading, routing, material control, dispatching, progress reporting and corrective action. Design of production control systems. 3 lectures/problem-solving and 1 three-hour laboratory. Prerequisites: MFE 221, 230.

ETP 299/299A/299L Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.

ETP 300 Applied Total Quality Management (3)

Study of technological and management specialization in Total Quality Management within the engineering environment. An overview of TQM as it relates to quality leadership within an organization. 3 lectures/problem-solving. Prerequisite: junior standing.

ETP 302 Industrial Safety (3)

An introduction to the problems of industrial safety. Emphasis upon accident prevention and control. Covers state and federal OSHA regulations and implications of the Williams-Steiger Occupational Safety and Health Act of 1970. 3 lectures/problem-solving. Prerequisite: junior standing.

ETP 371/391L Production and Facilities Planning/Laboratory (3/1)

Concepts and methods of planning for manufacturing processes and plant layout and facilities are covered. Local ordinance, lighting, fire safety and their impact on building design are emphasized. Scheduling, type of manufacturing processes, and material and inventory handling systems are discussed. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 126L or CAD class; Apparel Manufacturing students, junior level.

ETP 377 Manufacturing Systems Engineering Methods (3)

Analysis, application and computation of statistical methods and mathematical programming procedures as applied to engineering and industrial systems. Use of computer and software packages. 3 lectures/problem-solving. Prerequisites: ETT 215, MAT 131, course in fundamentals of statistics.

ETP 407 Manufacturing Engineering Value Analysis (3)

Selected topics and problems utilizing value analysis as a tool for determining the proper relationship between price, cost, and value received. An integration of technical and economical factors of quality. 3 lectures/problem-solving. Prerequisites: senior standing, ETT 305.

ETP 437/L, 438/L Nondestructive Evaluation I/Laboratory II/Laboratory (1/1) (1/1)

Discontinuities in materials and their detection. Process principles and equipment for penetrant, magnetic particle, ultrasonic, radiographic and eddy current methods. Reference to other processes. Radiation health physics. 1 lecture/problem-solving and 1 three-hour laboratory. Prerequisite: ETT 217.

ETP 499/499A/499L Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination.