ENGINEERING TECHNOLOGY PROGRAMS
College of Engineering

Introduction

The Engineering Technology (ET) Programs at CSULB serve society by graduating well-prepared professionals, who are provided with an excellent education in the fundamentals of Engineering Technology through a combination of theory and laboratory practice, and who are able to apply their knowledge and transform their ideas into working systems.

Career Possibilities

Computer Option: Hardware and software Computer Applications Engineers • Test Equipment Engineers • Manufacturing Engineers or Technical Sales Engineers in industry and organizations where a combination of hardware and software background is required

Electronics Option: Electronic Technician • Calibration Engineer • Construction Inspector • Computer Applications Engineer • Time Study Engineer • Facilities Planner • Field Engineer • Manufacturing Engineering • Operations Research Analyst • Sales Representative • Project Engineer • Associate Electronics Engineer • Product Design Engineer • Process Engineer • Instructor

General Requirements

All students in the BSET, BSEET, or BSCET programs must receive a minimum grade of "C" in each of the prerequisite courses before enrolling in any Engineering Technology course. In addition to any other all-university requirements regarding grade point averages for graduation, student must achieve a minimum of 2.0 average in all Engineering Technology courses.

Bachelor of Science in Computer Engineering Technology (120 units)

Administered by the Electrical Engineering Department.
Faculty Advisor - I-Hung Khoo
EE Department Office - ECS 561
Faculty Advisor's Office - ECS 517
Faculty Advisor's Telephone - (562) 985-5082

This program is available to students interested in the manufacturing of computers and the applications and operations aspects of computer hardware and software.

Emphasis is placed on specific job skills required of entry level professionals in computer industry, including systems analysis and design, data administration, networking, data communications, data acquisition, oral and written communication, and management principles.

Major Declaration

Freshmen admission to engineering majors is to a 'pre-major' status (i.e., Pre-Computer Engineering Technology). Continuation in the major will be subject to meeting specific lower division course and GPA requirements at CSULB that indicate the student's ability to succeed and complete the major. Transfer applicants and CSULB students seeking admission into Computer Engineering Technology must also meet similar major specific requirements. To become fully admitted into the Computer Engineering Technology major, all prospective students (i.e., pre-majors, undeclared, major changes) must have a minimum cumulative 2.5 GPA and complete the following lower-division courses with a minimum grade of "C" prior to earning 60 units:

Core Lower Division Major Requirements:
    MATH 122 (Calculus I), PHYS 100A (General Physics)
General Education Foundations Courses:
    Written and Oral Communication

Degree Progress

Students must complete the following requirements within one calendar year of declaring the major. Some students may need to take courses during Summer Session to meet these requirements. At the end of the year, students who have not met the requirements must either declare another major or meet with an Academic Advisor to determine if the student's performance in the courses merits an additional semester to complete.

First-Time Freshmen: A grade of "C" or better must be achieved in MATH 111, MATH 113, and PHYS 100A within one calendar year.

Transfer Students: A grade of "C" or better must be achieved in MATH 122 and PHYS 100A and B within one calendar year.

Requirements

Lower Division:
Take all the following courses:

MAE 172 Engineering Design Graphics (2)
    Prerequisites: None.

MATH 122 Calculus I (4)
    Prerequisite: Appropriate MDPT placement or a grade of "C" or better in MATH 111 and MATH 113.

PHYS 100A General Physics (4)
    Prerequisite: MATH 109 or MATH 113 or MATH 119A or MATH 122.

PHYS 100B General Physics (4)
    Prerequisites: PHYS 100A.

ENGR 101 Introduction to Engineering Profession (1)
    Prerequisite/Corequisite: MATH 111 or MATH 113 or MATH 122.

ENGR 102 Academic Success Skills (1)
    Prerequisite: ENGR 101 with a grade of "C" or better.

ENGR 203 Engineering Problem Solving & Analysis (3)
    Prerequisite: MATH 122 all with a grade of "C" or better.
    Corequisite: ENGR 203L.

ENGR 203L Engr Problem Solving & Analysis Lab (1)
    Prerequisite: MATH 122 all with a grade of "C" or better.
    Corequisite: ENGR 203.

ET 101 Introduction to Engineering Technology (1)
    Prerequisites: None.

ET 202 Probability and Statistics for Technology (3)
    Prerequisite: High school algebra.
    Corequisite: ET 202L.

ET 202L Probability & Statistics for Technology Lab (1)
    Prerequisites: 2 yrs high school algebra, geometry, and intermediate algebra (or MATH 010) or equivalent.
    Corequisite: ET 202.

ET 205 Computer Systems and Programming (1)
    Corequisite: ET 205L.

ET 205L Computer Systems and Programming Lab (1)
    Corequisite: ET 205.

ET 250 Circuit Analysis I (2)
Prerequisite: PHYS 100B with a grade of "C" or better.
Corequisite: ET 250L.

ET 250L Circuit Analysis I Laboratory (1)
Prerequisite: PHYS 100B with a grade of "C" or better.
Corequisite: ET 250.

ET 252 Circuit Analysis II (2)
Prerequisites: MATH 122; ET 250, ET 250L all with a grade of "C" or better. Corequisite: ET 252L.

ET 252L Circuit Analysis II Lab (1)
Prerequisites: MATH 122; ET 250, ET 250L all with a grade of "C" or better. Corequisite: ET 252.

ET 255 Introduction to Digital Electronics (2)
Prerequisites: ET 250, ET 250L all with a grade of "C" or better.
Corequisite: ET 255L.

ET 255L Introduction to Digital Electronics Lab (1)
Prerequisites: ET 250, ET 250L all with a grade of "C" or better.
Corequisite: ET 255.

ET 260 Solid State Electronic I (2)
Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 260L.

ET 260L Solid State Electronic I Lab (1)
Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 260.

ET 286 Intro to Object-Oriented Programming (2)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 286L.

ET 286L Intro to Object-Oriented Programming Lab (1)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 286.

Upper Division:

Take all the following courses:

ET 309 Industrial Communications and Leadership (3)
Prerequisites: ET 101 with a grade of "C" or better.

ET 311 Quality Engineering Technology (3)
Prerequisites: ET 202, ET 202L all with a grade of "C" or better.

ET 360 Control Instrumention (2)
Prerequisites: ET 260, ET 260L all with a grade of "C" or better.

Corequisite: ET 360L.

ET 360L Control Instrumention Lab (1)
Prerequisites: ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 360.

ET 386 Introduction to Microprocessors (2)
Prerequisite: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 386L.

ET 386L Introduction to Microprocessors Lab (1)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 386.

ET 387 Robot Programming and Mechatronics (2)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 387L.

ET 387L Robot Programming & Mechatronics Lab (1)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 387.

ET 388 Technical Applications Using Programming Languages (2)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 388L.

ET 388L Technical Applications Using Programming Languages Lab (1)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 388.

ET 442 Computer Circuits (2)
Prerequisites: ET 255, ET 255L all with a grade of "C" or better.
Corequisite ET 442L.

ET 442L Computer Circuits Lab (1)
Prerequisites: ET 255, ET 255L all with a grade of "C" or better.
Corequisite ET 442.

ET 486 Data Structures (2)
Prerequisites: ET 388, ET 388L all with a grade of "C" or better.
Corequisite: ET 486L.

ET 486L Data Structures Lab (1)
Prerequisites: ET 388, ET 388L all with a grade of "C" or better.
Corequisite: ET 486.

ET 487 Introduction to Data Communications and Networking (2)
Prerequisites: ET 286, ET 286L, ET 386, ET 386L or equivalents all with a grade of "C" or better.
Corequisite: ET 487L.

ET 487L Introduction to Data Communications and Networking Lab (1)
Prerequisites: ET 286, ET 286L, ET 386, ET 386L or equivalents all with a grade of "C" or better.
Corequisite: ET 487.

ET 488 Microcomputer Systems (2)
Prerequisites: ET 386, ET 386L all with a grade of "C" or better.
Corequisite: ET 488L.

ET 488L Microcomputer Systems Lab (1)
Prerequisites: ET 386, ET 386L all with a grade of "C" or better.
Corequisite: ET 488.

ET 489 Computer Interfacing (2)
Prerequisites: ET 442, ET 442L, ET 488, ET 488L all with a grade of "C" or better.
Corequisite: ET 489L.

ET 489L Computer Interfacing Lab (1)
Prerequisites: ET 442, ET 442L, ET 488, ET 488L all with a grade of "C" or better.
Corequisite: ET 489.

ET 492 Computer Controlled Industrial Systems (2)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 492L.

ET 492L Computer Controlled Industrial Systems Laboratory (1)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 492.

ET 494 Applied Systems Development Project (2)
Prerequisites: ET 386, ET 386L, ET 487, ET 487L all with a grade of "C" or better.
Corequisite: ET 494L.

ET 494L Applied Systems Development Project Lab (1)
Prerequisites: ET 386, ET 386L, ET 487, ET 487L all with

a grade of "C" or better.
Corequisite: ET 494.

CE 406 Project Cost-Benefit Analysis (3)
Prerequisites: GE Foundation requirements.

Take 3 units of either:

ET 312 Statistical Quality Control
Prerequisite: ET 311 all with a grade of "C" or better.

or

ET 461 Management of Manufacturing Operations.
Prerequisite: ET 410 with a grade of "C" or better.

Take at least 3 units from the following, in consultation with an advisor:

ET 409E or (ET 491, ET 491L) or (ET 497, ET 497L).

To meet prerequisite standards for courses in this program's requirements, a "C" or better is necessary in the following: ENGR 101, ET 101, ET 202, ET 202L, ET 205, ET 205L, ET 250, ET 250L, ET 252, ET 252L, ET 255, ET 255L, ET 260, ET 260L, ET 286, ET 286L, ET 311, ET 386, ET 386L, ET 388, ET 388L, ET 442, ET 442L, ET 487, ET 487L, ET 488, ET 488L, MATH 122, PHYS 100B.

Fieldwork Requirements

Fieldwork experience is required for the BS in Computer Engineering Technology, consisting of no less than three months full-time (40 hours/week) (or equivalent part-time) of employment in an approved industry or governmental agency. The student must hold a position equivalent to a technician or higher which affords the opportunity to exercise responsibility usually given to those who have completed two years of college. The fieldwork must be completed prior to graduation, be certified and approved by the faculty of the Department.

Concurrent and/or Enrollment in Another Institution

Students who wish to take, or have already taken, coursework in a community college or another institution to meet curricular requirements must petition the ET Undergraduate Advisor for approval.

Bachelor of Science in Electronics Engineering Technology (120 units)

Administered by the Electrical Engineering Department.
Faculty Advisor - I-Hung Khoo
EE Department Office - ECS 561
Faculty Advisor's Office - ECS 517
Faculty Advisor's Telephone - (562) 985-5082

The Electronics Engineering Technology program, prepares the student for a position as a technologist, in such industries as aerospace, computers, communications, biomedical, chemical, power, etc. Students are offered a wide range of training in topics such as instrumentation, controls, microprocessors, microelectronics, biomedical electronics, communications, motors and generators, robotics, computer applications, programming and interfacing. Moreover the program emphasizes written and oral communications skills as well as modern methods of industrial administration and supervision.

Major Declaration

Freshmen admission to engineering majors is to a 'pre-major' status (i.e., Pre-Electrical Engineering Technology). Continuation in the major will be subject to meeting specific lower division course and GPA requirements at CSULB that indicate the student's ability to succeed and complete the major. Transfer applicants and CSULB students seeking admission into Electrical Engineering Technology must also meet similar major specific requirements. To become fully admitted into the Electrical Engineering Technology major, all prospective students (i.e., pre-majors, undeclared, major changes) must have a minimum cumulative 2.5 GPA and complete the following lower-division courses with a minimum grade of "C" prior to earning 60 units:

Core Lower Division Major Requirements:
MATH 122 (Calculus I), PHYS 100A (General Physics)

General Education Foundations Courses:
Written and Oral Communication

Degree Progress

Students must complete the following requirements within one calendar year of declaring the major. Some students may need to take courses during Summer Session to meet these requirements. At the end of the year, students who have not met the requirements must either declare another major or meet with an Academic Advisor to determine if the student's performance in the courses merits an additional semester to complete.

First-Time Freshmen: A grade of "C" or better must be achieved in MATH 111 and 113, and PHYS 100A within one calendar year.

Transfer Students: A grade of "C" or better must be achieved in MATH 122 and PHYS 100A and B within one calendar year.

Requirements

Lower Division:

Take all the following courses:

MAE 172 Engineering Design Graphics (2)
Prerequisites: None.

MATH 122 Calculus I (4)
Prerequisite: Appropriate MDPT placement or a grade of "C" or better in MATH 111 and 113.

PHYS 100A General Physics (4)
Prerequisite: MATH 109 or MATH 113 or MATH 119A or MATH 122.

PHYS 100B General Physics (4)
Prerequisites: PHYS 100A.

ENGR 101 Introduction to Engineering Profession (1)
Prerequisite/Corequisite: MATH 111 or MATH 113 or MATH 122.

ENGR 102 Academic Success Skills (1)
Prerequisite: ENGR 101 with a grade of "C" or better.

ENGR 203 Engineering Problem Solving & Analysis (3)
Prerequisite: MATH 122 all with a grade of "C" or better.
Corequisite: ENGR 203L.

ENGR 203L Engr Problem Solving & Analysis Lab (1)
Prerequisite: MATH 122 all with a grade of "C" or better.
Corequisite: ENGR 203.

ET 101 Introduction to Engineering Technology (1)
Prerequisites: None.

ET 202 Probability and Statistics for Technology (3)
Prerequisite: High school algebra.
Corequisite: ET 202L.

ET 202L Probability & Statistics for Technology Lab (1)
Prerequisites: 2 yrs high school algebra, geometry, and intermediate algebra (or MATH 010) or equivalent.
Corequisite: ET 202.

ET 205 Computer Systems and Programming (1)
Corequisite: ET 205L.

ET 205L Computer Systems and Programming Lab (1)
Corequisite: ET 205.

ET 250 Circuit Analysis I (2)
Prerequisite: PHYS 100B with a grade of "C" or better.
Corequisite: ET 250L.

ET 250L Circuit Analysis I Laboratory (1)
Prerequisite: PHYS 100B with a grade of "C" or better.
Corequisite: ET 250.

ET 252 Circuit Analysis II (2)
Prerequisites: MATH 122; ET 250, ET 250L all with a grade of "C" or better. Corequisite: ET 252L.

ET 252L Circuit Analysis II Lab (1)
Prerequisites: MATH 122; ET 250, ET 250L all with a grade of "C" or better. Corequisite: ET 252.

ET 255 Introduction to Digital Electronics (2)
Prerequisites: ET 250, ET 250L all with a grade of "C" or better.
Corequisite: ET 255L.

ET 255L Introduction to Digital Electronics Lab (1)
Prerequisites: ET 250, ET 250L all with a grade of "C" or better.
Corequisite: ET 255.

ET 260 Solid State Electronic I (2)
Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 260L.

ET 260L Solid State Electronic I Lab (1)
Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 260.

ET 286 Intro to Object-Oriented Programming (2)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 286L.

ET 286L Intro to Object-Oriented Programming Lab (1)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 286.

Upper Division:
Take all the following courses:

ET 309 Industrial Communications and Leadership (3)
Prerequisites: ET 101 with a grade of "C" or better.

ET 311 Quality Engineering Technology (3)
Prerequisites: ET 202, ET 202L all with a grade of "C" or better.

ET 341 Solid State Electronic II (2)
Prerequisites: ENGR 203,ENGR 203L, ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 341L.

ET 341L Solid State Electronic II Lab (1)
Prerequisites: ENGR 203, 203L, ET 260, ET 260L all with a grade of "C" or better .
Corequisite: ET 341.

ET 350 Motors and Generators (2)
Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 350L.

ET 350L Motors and Generators Lab (1)
Prerequisite: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 350.

ET 360 Control Instrumention (2)
Prerequisites: ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 360L.

ET 360L Control Instrumention Lab (1)
Prerequisites: ET 260, ET 260L all with a grade of "C" or better.

Corequisite: ET 360.

ET 386 Introduction to Microprocessors (2)
Prerequisite: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 386L.

ET 386L Introduction to Microprocessors Lab (1)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 386.

ET 387 Robot Programming and Mechatronics (2)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 387L.

ET 387L Robot Programming & Mechatronics Lab (1)
Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 387.

ET 388 Technical Applications Using Programming Languages (2)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 388L.

ET 388L Technical Applications Using Programming Languages Lab (1)
Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 388.

ET 442 Computer Circuits (2)
Prerequisites: ET 255, ET 255L all with a grade of "C" or better.
Corequisite ET 442L.

ET 442L Computer Circuits Lab (1)
Prerequisites: ET 255, ET 255L all with a grade of "C" or better.
Corequisite ET 442.

ET 444 Telecommunications (3)
Prerequisites: ET 360, ET 360L all with a grade of "C" or better.

ET 447 Industrial Applications of Electronic Circuits (2)
Prerequisites: ET 341, ET 341L all with a grade of "C" or better.
Corequisite: ET 447L.

ET 447L Industrial Appl of Electronic Circuits Lab (1)
Prerequisites: ET 341, ET 341L all with a grade of "C" or better.
Corequisite: ET 447.

ET 460 Electronic Packaging and Design (2)
Prerequisites: ET 341, ET 341L all with a grade of "C" or better and senior standing.
Corequisite: ET 460L.

ET 460L Electronic Packaging and Design Lab (1)
Prerequisites: ET 341, ET 341L all with a grade of "C" or better and senior standing.
Corequisite: ET 460.

ET 488 Microcomputer Systems (2)
Prerequisites: ET 386, ET 386L all with a grade of "C" or better.
Corequisite: ET 488L.

ET 488L Microcomputer Systems Lab (1)
Prerequisites: ET 386, ET 386L all with a grade of "C" or better.
Corequisite: ET 488.

CE 406 Project Cost-Benefit Analysis (3)
Prerequisites: GE Foundation requirements.

Take 3 units of either:

ET 312 Statistical Quality Control
Prerequisite: ET 311 all with a grade of "C" or better.

or

ET 461 Management of Manufacturing Operations. Prerequisite: ET 410 with a grade of "C" or better.

Take at least 3 units from the following courses, in consultation with an advisor: ET 409B or ET 441 or (ET 445, ET 445L).

To meet prerequisite standards for courses in this program's requirements, a "C" or better is necessary in the following: MATH 122, PHYS 100B, ENGR 101, ENGR 203, ENGR 203L, ET 101, ET 202, ET 202L, ET 205, ET 205L, ET 250, ET 250L, ET 252, ET 252L, ET 255, ET 255L, ET 260, ET 260L, ET 286, ET 286L, ET 311, ET 341, ET 341L, ET 360, ET 360L, ET 386, ET 386L.

Fieldwork Requirements

Fieldwork experience is required for the BS in Electronics Engineering Technology, consisting of no less than three months full-time (40 hours/week) (or equivalent part-time) of employment in an approved industry or governmental agency. The student must hold a position equivalent to a technician or higher which affords the opportunity to exercise responsibility usually given to those who have completed two years of college.

The fieldwork must be completed prior to graduation, be certified and approved by the faculty of the Department.

Concurrent and/or Enrollment in Another Institution

Students who wish to take, or have already taken, coursework in a community college or another institution to meet curricular requirements must petition the ET Undergraduate Advisor for approval.

Engineering Technology Courses (E T)

LOWER DIVISION

101. Introduction to Engineering Technology (1)

Survey of professional activities and environment of engineering technologist. Covers role of technologist in American industry, the history of technology and the growth and future of those professionals who hold the Bachelor of Science degree in Engineering Technology.

(Lecture-Discussion 1 hour) Credit/No Credit grading only.

202. Probability and Statistics for Technology (3)

Prerequisite: High school algebra. Corequisite: ET 202L.

Statistics and probability theory, sampling, correlation, regression as applied to Engineering Technology.

(Lecture-problems 3 hours) Letter grade only (A-F).

202L. Probability and Statistics for Technology Laboratory (1)

Prerequisites: 2 yrs high school algebra, geometry, and intermediate algebra (or MATH 010) or equivalent. Corequisite: ET 202.

Laboratory exercises in statistics and probability theory, sampling, correlation, regression as applied to Engineering Technology. Simulation using statistical packages.

(Laboratory 3 hours) Letter grade only (A-F).

204. Applied Mechanics-Statics (3)

Prerequisites: MATH 122, PHYS 100A all with a grade of "C" or better.

Force systems acting on structures, moments, equilibrium, centroids, trusses, beams, cables, frames, machines, friction, section properties, masses, both U.S. and S.I. units of measurements.

(Lecture 2 hrs, activity 2 hrs) Letter grade only (A-F).

205. Computer Systems and Programming (1)

Corequisite: ET 205L.

Overview of computer systems, hardware, and software development. Hardware topics include central processing unit and memory, input/output devices, storage mechanism, and communication. Software topics include programming languages, operating systems, and systems analysis and design.

(Lecture – discussion, exercise, 1 unit) Letter grade only (A-F).

205L. Computer Systems and Programming Lab (1)

Corequisite: ET 205.

Laboratory exercises in computer programming to solve problems in business, manufacturing, research and simulation. An object-oriented programming language will be used for these activities.

(Laboratory 3 hours) Letter grade only (A-F). Same as CEM 205L

244. Machine Tools (1)

Corequisite: ET 244L.

Operations and use of the conventional and non-conventional machine tools.

Not open for credit to students with previous machine tools credit. (Lecture-Discussion 1 hour) Letter grade only (A-F).

244L. Machine Tools Laboratory (1)

Corequisite: ET 244.

Laboratory exercises using conventional and non-conventional machine tools.

Not open for credit to students with previous machine tools experience. (Laboratory 3 hours) Letter grade only (A-F).

250. Circuit Analysis I (2)

Prerequisite: PHYS 100B with a grade of "C" or better. Corequisite: ET 250L.

Fundamentals of DC theory, units of measurements, systems of units. Current, voltage, resistance, Ohm's law, power, energy. Series and parallel circuits. Methods of analysis and selected topics. Network theorems such as superposition, Thevenin's, Norton's and Millman's theorems.

(Lecture-Discussion 2 hours) Letter grade only (A-F).

250L. Circuit Analysis I Laboratory (1)

Prerequisite: PHYS 100B with a grade of "C" or better. Corequisite: ET 250.

Laboratory exercises will be conducted on AC and DC circuits using proto boards and power supplies, multi-meters, function generators, oscilloscopes and frequency counters.

(Laboratory 3 hours) Letter grade only (A-F).

252. Circuit Analysis II (2)

Prerequisites: MATH 122, ET 250, ET 250L; all with a grade of "C" or better. Corequisite: ET 252L.

Study of circuit analysis techniques in AC, including network theorems, mesh and nodal analysis, transients, time domain and phasors, magnetic circuits, sinusoidal and non-sinusoidal wave forms, resonance circuits (series and parallel), filters (low-pass, high-pass, passband and bandstop).

(Lecture-Discussion 2 hours) Letter grade only (A-F).

252L. Circuit Analysis II Laboratory (1)

Prerequisites: MATH 122, ET 250, ET 250L; all with a grade of "C" or better.
Corequisite: ET 252.

Laboratory exercises will be conducted on AC circuits using proto boards and AC power supplies, function generators, oscilloscopes, and frequency counters.

(Laboratory 3 hours) Letter grade only (A-F).

255. Introduction To Digital Electronics (2)

Prerequisites: ET 250, ET 250L all with a grade of "C" or better.
Corequisite: ET 255L.

Combinational logic utilizing Boolean algebra and the binary numbering system. Includes Karnaugh maps, truth tables, coding, switching circuits, converters and logic circuit elements.

(Lecture-problems 2 hours) Letter grade only (A-F).

255L. Introduction to Digital Electronics Laboratory (1)

Prerequisites: ET 250, ET 250L all with a grade of "C" or better.

Corequisite: ET 255.

Laboratory exercises in basic logic circuits. Topics included are breadboarding, basic gates, and combinational circuits.

(Laboratory 3 hours) Letter grade only (A-F).

260. Solid-State Electronics I (2)

Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 260L.

Analysis and design of solid-state electronic circuits using diodes, bipolar, unijunction and field-effect devices.

(Lecture-Discussion 2 hours) Letter grade only (A-F).

260L. Solid State Electronics I Laboratory (1)

Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 260.

Laboratory exercises in breadboarding and measurements of solid-state circuits utilizing all types of electronic measuring equipment.

(Laboratory 3 hours) Letter grade only (A-F).

264. Industrial Tooling (1)

Corequisite: ET 264L.

Design of tools for production. Typical tooling problems include working drawings and hardware.

(Lecture-Discussion 1 hour) Letter grade only (A-F).

264L. Industrial Tooling Laboratory (1)

Corequisite: ET 264.

Laboratory experiments in tool design in relation to mass part production.

(Laboratory 3 hours) Letter grade only (A-F).

286. Introduction to Object–Oriented Programming (2)

Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 286L.

Introduction to an object–oriented programming language (C++). Problem analysis and software development methodology. Emphasis on applications to technology

(Lec–Discussion 2 hrs) Letter grade only (A-F).

286L. Introduction to Object–Oriented Programming Laboratory (1)

Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 286.

Introduction to an object–oriented programming language (C++). Problem analysis and software development methodology. Emphasis on applications to technology.

Letter grade only (A-F). (Laboratory 3 hours)

UPPER DIVISION

301. Engineering Materials (2)

Prerequisites: CHEM 111A with a grade of "C" or better.
Corequisite: ET 301L.

Study of physical and mechanical properties and applications of engineering materials.

Letter grade only (A-F). (Lecture–Discussion 2 hours)

301L. Engineering Materials Laboratory (1)

Prerequisites: CHEM 111A with a grade of "C" or better.
Corequisite: ET 301.

Laboratory investigation and experiments in the application of engineering materials. Field trips.

Letter grade only (A-F). (Lab 3 hrs)

304. Applied Mechanics Strength of Materials (2)

Prerequisite: ET 204 with a grade of "C" or better.

Analysis of strength and ridigity of structural members in resisting applied forces, stress, strain, shear, moment, deflections, combined stresses, connections, and moment distribution.

Letter grade only (A-F). (Lecture-Discussion 1 hour, Activity 2 hours)

307. Industrial Safety (2)

Prerequisite: Junior Standing.

Survey of industrial safety administration, engineering and management. Emphasis is placed on the role of the first line supervisor in establishing and maintaining a safe, healthful work environment for employees. Introduction to supporting computer resources used in the safety field.

Letter grade only (A-F). (Lecture–Discussion 2 hours)

309. Industrial Communications and Leadership (3)

Prerequisites: ET 101 with a grade of "C" or better.

English Composition. Principles, theories of industrial communications and management for engineering technology. Management functions of planning, organizing, motivating, leading, controlling and staffing in technical environment. Intro decision support models. Written/oral technical information; communication forms and procedures of industry, with computer applications.

(Lecture-Discussion, 3 hours) Letter grade only (A-F).

311. Quality Engineering Technology (3)

Prerequisites: ET 202, ET 202L all with a grade of "C" or better.

Junior standing. Quality engineering technology principles and practices in industry, including management concepts, inspection practices, costs of quality and testing.

(Lecture–Discussion 3 hours) Letter grade only (A-F).

312. Statistical Quality Control (3)

Prerequisite: ET 311 all with a grade of "C" or better.

Statistical process control; including use of statistical methods for analysis and improvement of product quality, control charts, linear correlation; sampling procedures, stratification, cause and effect analysis, process capability and introduction to design of experiments.

(Lecture-Discussion 3 hours) Letter grade only (A-F).

313. Quality Assurance, Inspection Measurement and Testing (2)

Prerequisite: ET 311 with a grade of "C" or better.
Corequisite: ET 313L.

Theory and application of inspection procedures, instrument calibration, precision measurements including theory and application of non-destructive testing of materials for quality control.

Letter grade only (A-F).

313L. Quality Assurance, Inspection Measurement and Testing Laboratory (1)

Prerequisite: ET 311 with a grade of "C" or better.
Corequisite: ET 313.

Laboratory experiments; instrument calibration including standards and precision measurements including the use of non destructive test equipment for quality control.

(Laboratory 3 hours) Letter grade only (A-F)

335. Engineering Materials and Processes I (3)

Corequisite: ET 335L.

Examination of engineering materials and manufacturing processes including the study of: Phase diagrams; heat treatment; metal casting processes; welding and soldering; corrosion, powder metallurgy, electronic fabrication; tribology, friction, wear, lubrication; surface treatment, coating and cleaning.

(Lecture - Discussion 3 hours) Letter grade only (A-F).

335L. Engineering Materials Processes I Laboratory (1)

Corequisite: ET 335.

Laboratory exercises in engineering materials and manufacturing processes including the study of: Phase diagram; heat treatment; casting; metallography and electronic manufacturing processes.

(Laboratory 3 hours) Letter grade only (A-F).

341. Solid State Electronics II (2)

Prerequisites: ENGR 203, ENGR 203L, ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 341L.

Miller's Theorem, integrated circuits, feedback, operational amplifiers, Fourier series, distortion, modulation, phase-locked loops, linear and non-linear circuits, and breadboarding.

(Lec-Discussion 2 hrs) Letter grade only (A-F).

341L. Solid State Electronics II Laboratory (1)

Prerequisites: ENGR 203, ENGR 203L, ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 341.

Laboratory exercises in design and measurement of various circuits using operational amplifiers, comparators, regulators, silicon controlled rectifiers, frequency mixers and phase-locked loops.

(Lab 3 hours) Letter grade only (A-F).

350. Motors and Generators (2)

Prerequisites: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 350L.

Study of electric rotating machinery, its theories, principles, design and applications in automation industries.

(Lecture-Problems 1 hour) Letter grade only (A-F).

350L. Motors and Generators Laboratory (1)

Prerequisite: ET 252, ET 252L all with a grade of "C" or better.
Corequisite: ET 350.

Laboratory exercises in applications and design of rotating machines. Topics covered are DC machines, synchronous machines, servomotor, step motor, and control circuits.

(Laboratory 3 hours) Letter grade only (A-F).

360. Control Instrumentation (2)

Prerequisites: ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 360L.

Application and basic design of analog and digital control instrumentation for industrial processes. Physical and electrical properties of thermal, mechanical and optical transducers with associated signal conditioning.

(Lecture-Problems 2 hours) Letter grade only (A-F).

360L. Control Instrumentation Laboratory (1)

Prerequisites: ET 260, ET 260L all with a grade of "C" or better.
Corequisite: ET 360.

Laboratory exercises in developing and measuring various control systems utilizing operational amplifiers, transducers, thermocouples, bridges, and various pressure devices.

(Laboratory 3 hours) Letter grade only (A-F).

363. Kinematics of Mechanisms (3)

Prerequisites: ET 204 with a grade of "C" or better.

Mathematical and graphical approaches to analyze the motion of mechanisms, for further machine development, through studies of displacement, velocity and acceleration of mechanical elements.

(Lecture-Discussion 2 hours, Activity 2 hours) Letter grade only (A-F).

365. Fluid Power and Control (2)

Prerequisite: ET 204 with a grade of "C" or better.
Corequisite: ET 365L.

Fundamentals and application of hydraulic, pneumatic and vacuum power as used in current manufacturing plants.

(Lecture–Discussion 2 hours) Letter grade only (A-F).

365L. Fluid Power and Control Laboratory (1)

Prerequisite: ET 204 with a grade of "C" or better.

Corequisite: ET 365.

Demonstration and operation of fluid power systems. Design and selection of components for specific applications. Computer data acquisition and analysis.

(Laboratory 3 hours) Letter grade only (A-F).

386. Introduction to Microprocessors (2)

Prerequisite: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 386L.

Theory and concepts of programming, hardware configuration, and functional capabilities of microcomputer systems including peripheral devices.

(Lecture-Problems 2 hours) Letter grade only (A-F).

386L. Introduction to Microprocessors Laboratory (1)

Prerequisite: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 386.

Laboratory exercises in programming microcomputers. Topics included are number systems, microcomputer structure, mnemonic, binary code, peripheral devices operations, stand alone operations, and system operations.

(Laboratory 3 hours) Letter grade only (A-F).

387. Robot Programming and Mechatronics (2)

Prerequisites: ET 205, ET 205L all with a grade of "C" or better.
Corequisite: ET 387L.

Basic concepts of robot manipulators, robot kinematics, robot programming languages. Applications of industrial robots, machine vision systems. Basic concepts of mechatronic systems: combine hardware, software, interface, and system integration to make an intelligent system. Sensors and actuators for robotics and mechatronic systems.

(Lecture-Problems 2 hours) Letter grade only (A-F).

387L. Robot Programming and Mechatronics Laboratory (1)

Prerequisites: ET 205, ET 205L all with a grade of "C" or better. Corequisite: ET 387.

Laboratory exercises in industrial and educational robot operation and applications. Laboratory exercises on mechatronic systems. Robot systems and their computer language instructions will be used. The experiments include teach pendant programming, high level language programming, workcell applications, continuous path programming.

Letter grade only (A-F).

388. Technical Applications Using Programming Languages (2)

Prerequisites: ET 286, ET 286L all with a grade of "C" or better. Corequisite: ET 388L.

Techniques for design and development of industrial programs that includes composite program design, module coupling/strength, program testing, top-down structured programming concepts and tools, object oriented programming, and memory management. Concepts are investigated and examined for use in solving complex problems.

(Lecture-problems 2 hours)

388L. Technical Applications Using Programming Languages Laboratory (1)

Prerequisites: ET 286, ET 286L all with a grade of "C" or better. Corequisite: ET 388.

Techniques for design and development of industrial programs that includes composite program design, module coupling/strength, program testing, top-down structured programming concepts and tools, object oriented programming, and memory management. Concepts are investigated and examined for use in solving complex problems.

(Lab 3 hours)

390. Applied Computer-Aided Design and Manufacturing (2)

Prerequisites: ET 205, ET 205L all with a grade of "C" or better. Corequisite: ET 390L.

Roll of the computers in the manufacturing process, application of CAD/CAM systems, hardware and software components for automation, part programming for manufacturing, computer controlled manufacturing equipment, simulation, programming the factory.

(Lecture - Discussion 2 hours) Letter grade only (A-F).

390L. Applied Computer-Aided Design and Manufacturing Laboratory (1)

Prerequisites: ET 205, ET 205L all with a grade of "C" or better. Corequisite: ET 390.

Use of microcomputer based hardware and software to solve 2D and 3D modeling problems. Computer automation software packages. Also includes part programming and CAD/CAM data exchange exercises.

(Laboratory 3 hours) Letter grade only (A-F).

409. Selected Topics in Engineering Technology (1-3)

Prerequisites: Senior standing in ET, consent of instructor.

Advanced work of a technical nature within an area of specialization on an experimental or research basis.

Letter grade only (A-F). Topics announced in the *Schedule of Classes*.

- B. Electronics Technology
- C. Manufacturing Technology
- D. Quality Assurance
- E. Computer Technology
- F. Environmental Technology

410. Cost Engineering and Analysis (3)

Prerequisites: Economics course, Junior standing.

Introduction to the concepts of capital and operations budgets, capital acquisitions, economic evaluations of capital alternatives and factors of the time–value of money in industrial operations and construction industries.

(Lecture–Discussion 3 hours) Letter grade only (A-F).

418. Production Methods and Process Improvement (3)

Prerequisite: ET 410 with a grade of "C" or better.

Simplification and improvement of manufacturing operations through the use of production analysis tools for optimum production economy. Also included is the investigation of production automation applications for improving manufacturing process, quality and productivity.

(Lecture-Discussion 3 hours) Letter grade only (A-F).

419. Design of Experiments (3)

Prerequisite: ET 312 with a grade of "C" or better.

Advanced statistical analysis applied to quality functions. Comparative and single factor experiments. Factorial designs and multiple regression.

(Lecture-Discussion 3 hours) Letter grade only (A-F).

435. Engineering Materials and Processes II (3)

Prerequisites: ET 335, ET 335L all with a grade of "C" or better. Corequisite: ET 435L.

Application of engineering materials and manufacturing processes including: rolling; forging; extrusion and drawing; sheet-metal forming; manufacturing of plastics and composites; material removal processes and rapid prototyping.

(Lecture-Discussion 3 hours) Letter grade only (A-F).

435L. Engineering Materials and Processes II Laboratory (1)

Prerequisites: ET 335, ET 335L all with a grade of "C" or better. Corequisite: ET 435.

Continuation of ET 335L. Laboratory exercises in: welding processes; machining processes; metal forming; manufacturing of composite materials.

(Laboratory 3 hours) Letter grade only (A-F).

441. Theory of Electronic Control (3)

Prerequisites: ET 360, ET 360L all with a grade of "C" or better.

Procedures for the design, preparation, and evaluation of electronic systems that control manufacturing and production processes, simulation analysis for sensing, programming, and actuating operations.

(Lecture-Discussion 3 hours) Letter grade only (A-F).

442. Computer Circuits (2)

Prerequisites: ET 255, ET 255L all with a grade of "C" or better. Corequisite ET 442L.

Introduction to digital hardware design. Combinational/sequential logic circuits and systems and application of integrated circuits to logic controls. Programmable logic devices, Field-programmable gate array, Circuit synthesis, and analysis.

(Lecture-Problems 2 hours) Letter grade only (A-F).

442L. Computer Circuits Laboratory (1)

Prerequisites: ET 255, ET 255L all with a grade of "C" or better. Corequisite ET 442.

Laboratory study of digital computer circuits design and implementation. Standard designing and trouble-shooting procedures will be discussed. Topics covered are multivibrator, register, counter, decoder, arithmetic circuits, and memory.

(Laboratory 3 hours) Letter grade only (A-F).

444. Telecommunications (3)

Prerequisites: ET 360, ET 360L all with a grade of "C" or better.

National Communication Network, decibels, transmission units, transmission lines, characteristic impedance, loading systems, lattice networks, PCM, Nyquist Criterion, Bessel functions, coaxial cable, fiber optics, microwave, impedance matching, and Smith chart.

(Lecture-Discussion 3 hours) Letter grade only (A-F).

445. Microelectronics (2)

Prerequisites: ET 350, ET 350L all with a grade of "C" or better. Corequisite: ET 445L.

Design, processing and applications of monolithic and hybrid microcircuits for analog and digital systems.

(Lecture 2 hours) Letter grade only (A-F).

445L. Microelectronics Laboratory (1)

Prerequisites: ET 350, ET 350L all with a grade of "C" or better. Corequisite: ET 445.

Laboratory exercises in the processing of thick-film and thin-film materials, ultrasonic and thermocompression wire bonding and laser resistive trimming. Practical application and equipment utilization is emphasized.

(Laboratory 3 hours) Letter grade only (A-F).

447. Industrial Applications of Electronic Circuits (2)

Prerequisites: ET 341, ET 341L all with a grade of "C" or better.

Corequisite: ET 447L.

An in-depth study of the applications of important electronic circuit concepts in industry. Analysis of circuits and how they work in industrial applications. Techniques for troubleshooting of design circuits. Biomedical electronic circuits which have industrial applications are emphasized.

(Lecture-Discussion 2 hours) Letter grade only (A-F).

447L. Industrial Applications of Electronic Circuits Laboratory (1)

Prerequisites: ET 341, ET 341L all with a grade of "C" or better. Corequisite: ET 447.

Laboratory exercises include constructing circuits which have important applications in industry. Troubleshooting methodology emphaiszed throughout. Assignments focus on biomedical electronic circuits which have industrial applications.

(Laboratory 3 hours) Letter grade only (A-F).

460. Electronics Project Design and Development (2)

Prerequisites: ET 341, ET 341L all with a grade of "C" or better and senior standing.
Corequisite: ET 460L.

Integrative learning capstone course, focusing on electronics project design and development. Product planning, implementation planning, proposal and approvals, implementation, system integration, packaging and testing. Written communication, teamwork, demonstration, and oral presentation on finished product.

This capstone course is open to Electronics Technology majors only. Letter grade only (A-F). (Lecture-Discussion 2 hours)

460L. Electronics Project Design and Development Laboratory (1)

Prerequisites: ET 341, ET 341L all with a grade of "C" or better and senior standing.
Corequisite: ET 460.

Laboratory on Electronics Project Design and Development. Product planning, implementation planning, proposal and approvals, implementation, system integration, packaging and testing. Written communication, teamwork, demonstration, and oral presentation on finished product.

Letter grade only (A-F). (Laboratory 3 hours)

461. Management of Manufacturing Operations (3)

Prerequisite: ET 410 with a grade of "C" or better.

Application of analytical planning and control techniques to the resources of industry including the physical plant, equipment, personnel, inventories and supplies use in the production of products and services.

(Lecture-Discussion 3 hrs) Letter grade only (A-F).

486. Data Structures (2)

Prerequisites: ET 388, ET 388L all with a grade of "C" or better. Corequisite: ET 486L.

Data structures and applications. Choice and implementation of appropriate data structures for applications. Treatment of arrays, lists, stacks, queues, lined lists, trees, and assorted algorithms. Introduction to search and sorting. File organization techniques.

(Lecture-Problems 2 hours) Letter grade only (A-F).

486L. Data Structures Laboratory (1)

Prerequisites: ET 388, ET 388L all with a grade of "C" or better. Corequisite: ET 486.

Laboratory exercises in data structures and applications. A recursive programming language will be used.

(Laboratory 3 hours) Letter grade only (A-F).

487. Introduction to Data Communications and Networking (2)

Prerequisites: ET 286, ET 286L, ET 386, ET 386L or equivalents all with a grade of "C" or better.
Corequisite: ET 487L.

Introduction to data communications fundamentals, peer-to-peer and client/server network models. Hardware and software technology, Protocols, networks, relational database technology, and security. Example applications, tools and development environments, Groupware, middleware. A design project and class presentation is required.

(Lecture-discussion 2 hours) Letter grade only (A-F).

487L. Introduction to Data Communications and Networking Laboratory (1)

Prerequisites: ET 286, ET 286L, ET 386, ET 386L or equivalents all with a grade of "C" or better.
Corequisite: ET 487.

Laboratory and programming exercises introducing the students to data communications and Networking technology. Protocols, networks, relational database technology, and security. Applications using software/hardware tools and development environments.

(Laboratory 3 hours) Letter grade only (A-F).

488. Microcomputer Systems (2)

Prerequisites: ET 386, ET 386L all with a grade of "C" or better. Corequisite: ET 488L.

Study of available microprocessors and microcomputer systems. Topics cover microcomputer architecture, software structure, assembly language, central processing unit, input/output, memory manipulation, and interfacing applications in Engineering Technology.

(Lecture-problems 2 hours) Letter grade only (A-F).

488L. Microcomputer Systems Laboratory (1)

Prerequisites: ET 386, ET 386L all with a grade of "C" or better. Corequisite: ET 488.

Laboratory experience in microcomputer architecture, assembly language programming, and interfacing applications in Engineering Technology. Topics covered are central processing unit function, memory organization, and input/output operation. Available microcomputer systems will be used. Applications in Engineering Technology.

(Laboratory 3 hours) Letter grade only (A-F).

489. Computer Interfacing (2)

Prerequisites: ET 442, ET 442L, ET 488, ET 488L all with a grade of "C" or better.

Corequisite: ET 489L.

Study of theories and techniques that are used in peripheral control and interfacing. Topics covered are serial interfacing, Parallel interfacing, timing, handshaking, A/D converters, buffering, and UARTs.

(Lecture-Discussion 2 hours) Letter grade only (A-F).

489L. Computer Interfacing Laboratory (1)

Prerequisites: ET 442, ET 442L, ET 488, ET 488L all with a grade of "C" or better.

Corequisite: ET 489.

Laboratory exercises in computer interfacing applications and design. Available computer system and its assembly language instructions will be used.

(Laboratory 3 hours) Letter grade only (A-F).

491. Embedded Processors and Systems (2)

Prerequisites: ET 489, ET 489L all with a grade of "C" or better.
Corequisite: ET 491L.

Embedded microprocessors, embedded systems, development concepts, principles, and applications. Hardware/software tradeoffs, interfacing issues, memory sizing, timing, code and power optimization issues. Application requirements, platform selection, RISC vs. CISC issues, co-processors vs. ASIC's.

(Lecture-discussion 2 hours) Letter grade only (A-F).

491L. Embedded Processors and Systems Laboratory (1)

Prerequisites: ET 489, ET 489L all with a grade of "C" or better.

Corequisite: ET 491.

Laboratory exercises on embedded system development. Emphasis will be on application requirements, platform selection, interfacing, memory sizing, timing, code and power optimization. Use of development environments and evaluation boards.

(Laboratory 3 hours) Letter grade only (A-F).

492. Computer Controlled Industrial Systems (2)

Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 492L.

Concepts of computer-based control of industrial systems and data acquisition. Signals and measurements, noise, resolution, signal conditioning. Software and hardware for data acquisition and control.

(Lecture-discussion, 2 hours) Letter grade only (A-F).

492L. Computer Controlled Industrial Systems Laboratory (1)

Prerequisites: ET 286, ET 286L all with a grade of "C" or better.
Corequisite: ET 492.

Laboratory exercises on computer-based control of industrial systems and data acquisition. Software and hardware for data acquisition and control. Emphasis placed on object-oriented languages and creation of graphical user interfaces for data acquisition, display and control.

(Laboratory, 1 hour) Letter grade only (A-F).

494. Applied Systems Development Project (2)

Prerequisites: ET 386, ET 386L, ET 487, ET 487L all with a grade of "C" or better.
Corequisite: ET 494L.

Integrative learning capstone course, focusing on computer technology project design and development. Systems development concepts, principles, and practices. Project management techniques, interviewing, forms analysis, structured methods. Written communication, teamwork, demonstration, and oral presentation on finished product.

(Lecture-Discussion 2 hours) Letter grade only (A-F).

494L. Applied Systems Development Project Laboratory (1)

Prerequisites: ET 386, ET 386L, ET 487, ET 487L all with a grade of "C" or better.
Corequisite: ET 494.

Laboratory on Applied Systems Development Project. Systems development concepts, principles, and practices. Project management techniques, interviewing, forms analysis, structured methods. Written communication, teamwork, demonstration, and oral presentation on finished product.

(Laboratory 3 hours) Letter grade only (A-F).

497. Computer Network Technology (2)

Prerequisites: ET 487, ET 487L all with a grade of "C" or better.
Corequisite: ET 497L.

Hardware and software technology as it relates to computer networking. LAN, WAN environments and access methods, Ethernet, ATM, Bridges, routers, gateways and intelligent hubs. Networking protocols. Security, Load balancing, and the use of simulation tools in designing networks.

(Lecture-discussion 2 hours) Letter grade only (A-F).

497L. Computer Network Technology Laboratory (1)

Prerequisites: ET 487, ET 487L all with a grade of "C" or better.
Corequisite: ET 497.

Laboratory exercises using hardware and software technology related to computer networking. Internetworking laboratory, Ethernet, ATM, Bridges, routers, gateways, and intelligent hubs. Security, Load balancing, and the use of simulation tools.

(Laboratory 3 hours) Letter grade only (A-F).

498. Manufacturing Engineering Technology Capstone Project (3)

Prerequisite: Senior standing.

Group project involving analysis, design, tooling and production processes for product manufacture. Economic, market and capital requirements, manpower analysis. Written reports and oral presentations required.

(Lecture 2 hours, Activity 2 hours) Letter grade only (A-F).