Engineering Technology

Engineering technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods, combined with technical skills, for the implementation and extension of existing technologies. Engineering technology education focuses on preparing engineering technologists for positions that involve product development and improvement, system development, management, manufacturing and engineering operational functions. Graduates also enter the technical sales and customer services field, or continue in graduate work in engineering or management. Placement of graduates has been excellent.

The Engineering Technology Program awards Bachelor of Science in Engineering Technology (BSET) degrees for each of the following degree options: Construction Engineering Technology (CET), Electrical and Computer Engineering Technology (ECET), Mechanical Engineering Technology (MET), Medical Informatics Technology (MIT), Surveying Engineering Technology (SET), and Technology Education (TEED). The department also awards a Bachelor of Science (BS) degree in Concrete Industry Management (CIM).

The options in construction engineering technology, electrical and computer engineering technology, mechanical engineering technology and surveying engineering technology are accredited by the Technology Accreditation Commission of ABET (TAC of ABET) http://abet.org

Many students choose to complete their freshman and sophomore years at a community college or a technical institute, and obtain an associate's degree in applied science from these institutions. It is strongly recommended that students talk to an academic advisor at NJIT while they are still pursuing their associate's degree. The academic advisor will explain the transfer process in detail as well as suggest elective courses that may be beneficial. Contact an advisor by calling the Department of Engineering Technology at (973) 596-3228, or by email at EngineeringTechnology@njit.edu.

After being admitted to NJIT, students must meet with an academic advisor to discuss the curriculum and any special interests the student might have. Students who lack necessary courses will be assigned bridge courses to make up the required prerequisites. Generally, courses taken at the freshman and sophomore level at the community colleges cannot substitute for junior or senior NJIT engineering technology courses.

Engineering technology students are expected to meet with their faculty advisor each semester to schedule courses and review their progress in the program. The advisor must approve all courses, including electives, prior to registration.

**NJIT Faculty**

**B**

Barnes, William, Associate Professor

Brateris, Daniel J., University Lecturer

**E**

English, Robert, Professor Emeritus

**J**

Juliano, Thomas, Associate Professor

**K**

Khader, Michael, Associate Professor

**L**

Lieber, Samuel C., University Lecturer

**M**

Mahgoub, Mohamed A., Assistant Professor

Miima, John B., Assistant Professor

**P**

Potts, Laramie, Associate Professor

**R**

Rabie, Mohammad A., University Lecturer

Rahman, Sahidur, University Lecturer
Rockland, Ronald H., Professor

Sengupta, Arijit, Associate Professor

Washington, David W, Associate Professor

Wiggins, John, Senior University Lecturer

Programs

- Engineering Technology, Computer Technology (CMPT) - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/technology/computer-technology)
- Engineering Technology, Mechanical Engineering Technology (MET) - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/technology/mechanical-engineering-technology)
- Engineering Technology, Medical Informatics Technology (MIT) - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/technology/medical-informatics-technology)
- Concrete Industry Management (CIM) - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/technology/concrete-industry-management-technology)


Engineering Technology Courses

CET 233. Structural Analysis in Construction. 3 credits, 3 contact hours (3:0:0).
Prerequisite: MET 237. This course will cover the aspects of the design and construction of structural steel and reinforced concrete for construction engineering technology students. This will include the design of beams, slabs and columns as well review of the connection of these structural members as encountered in practice.

CET 313. Construction Procedures I. 3 credits, 3 contact hours (3:0:0).
Corequisite: CET 317. An introduction to heavy construction practices. Emphasis is on construction equipment, site preparation, earthmoving, compaction, dewatering, piles, drilling and blasting, and tunnelling. Case studies in heavy construction are used.

CET 314. Construction Procedures II. 3 credits, 3 contact hours (3:0:0).
Prerequisites: CET 313, CET 317. An introduction to building construction practices and building materials. Emphasis is on structural systems, construction materials and detailed finishing operations required to make a serviceable structure. Case studies in building construction are used.

CET 317. Construction Computing. 3 credits, 3 contact hours (3:0:0).
Prerequisites: CS 106 Application of available software to construction-related computing problems, including: strength of materials, structural analysis, fluids/ hydraulics, surveying, scheduling, cost estimating, and computerized drafting (CAD).

CET 322. Construction Codes and Regulations. 3 credits, 3 contact hours (3:0:0).
An introduction to the New Jersey Uniform Construction Code, the BOCA National Building Code, NJ DOT Standard Specifications and the CSI specification format. A code analysis of a typical construction project is undertaken.

CET 323. Construction Safety. 3 credits, 3 contact hours (3:0:0).
Prerequisites: CET 313 and CET 314 This course will address the safety issues encountered in construction as mandated by the Occupational Safety and Health Act (OSHA)and other similar regulations.
CET 331. Structural Systems. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CET 233. Study of types and behavior of modern structures using both analytical and intuitive techniques. Examples include beam and column, one- and two-way slab systems, wood and masonry systems, and wind and seismic analysis.

CET 341. Soils and Earthwork. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MET 237 A study of the significant soil types and tests. Problems are investigated relating to soil mechanics, soil supported foundations for engineering structures. Appropriate field trips are made.

CET 411. Cost Estimating. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CET 313, CET 314, CET 317. Take off of quantities of materials from typical building and highway projects. Pricing for labor, materials, and equipment. Crew sizes, productivity and manpower leveling. Computerized cost estimating and take off methods. Prepare a complete bid estimate for a construction project.

CET 413. Environmental Science. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CET 313, CET 314, CET 431. An introduction to construction-related environmental science topics, including basic environmental chemistry, geology, ground water hydrology, basic air quality, surface water run-off, erosion and sedimentation control, indoor air quality, and vibration analysis. Case studies cover various construction activities with respect to their effect on the environment and the manner in which they can be controlled.

CET 415. Construction Project Management. 3 credits, 3 contact hours (3;0;0).
Restriction: Senior standing in construction engineering technology or construction management technology. An introduction to construction management and administration methods and procedures including the design and construction process, project organizational structure, construction planning, contract administration, records and reports, financial management, risk analysis, manual and computerized GANTT and CPM scheduling, change orders and extra work, claims and disputes, cost accounting and documentation.

CET 416. Senior Construction Project. 2 credits, 3 contact hours (1;2;0).
Prerequisites: CET 415, second semester senior standing in construction engineering technology or construction management technology. Simulates the methods and procedures used to successfully manage a construction project. Provides familiarization with construction methods, productivity control, quality control, advanced field and office administration techniques, problem solving, and construction automation. Extensive use of construction-related computer software. Written submittals and oral presentations are required.

CET 421. Construction Contracts. 3 credits, 3 contact hours (3;0;0).
Legal aspects of the various types of construction contracts and specifications. Scope, format, and use of various types of contracts such as owner-contractor and contractor-sub-contractor.

CET 431. Construction Testing. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET237 Exposure to a variety of construction-related field tests and field testing equipment. Includes concrete mix design, concrete testing, soil density and compaction, asphalt tests, load testing of wood, mortar analysis and testing, brick and CMU testing, and quality control methods and procedures for finishes.

CET 435. Design of Temporary Structures. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CET 331. Analysis of loadings on, and design of, temporary structures required in construction. Formwork, shoring and scaffolding systems, temporary bridges, trenching, and temporary retaining walls are among the subjects covered. Construction safety associated with temporary structures is stressed.

CET 460. Forensics in Construction. 3 credits, 3 contact hours (3;0;0).
Restriction: Senior standing in construction engineering technology. Construction failure, in its many forms, are both interesting and instructive and in the context of this course students will study construction failures in their many forms.

CET 490. Special Project. 3 credits, 3 contact hours (0;0;3).
Prerequisite: Senior standing in construction engineering technology. The student works on one or more individually selected projects guided by the department staff. The project must be construction related and may include planning, research (library or lab), engineering report, and statistical, analytical, or field investigation. Any of these may follow class-inspired direction, or the students may branch out on their own. The project(s) of each student must be completed and professionally presented by assigned due date for appropriate review and recording of accomplishments.

CET 491. Special Projects. 1 credit, 1 contact hour (1;0;0).
Restriction: Senior standing in construction engineering technology. The student works on an individually selected project guided by the department staff. The project may be design- or construction-related and may include research, engineering design, technical report, or field investigation. Requirements will include a written submittal.

CET 492. Special Projects. 2 credits, 2 contact hours (0;0;2).
Restriction: Senior standing in construction engineering technology. The student works on a selected project guided by the department staff. The project may be design or construction related and may include research, engineering design, technical report or field investigation. Requirements will include a written submittal.
CET 493. Special Projects. 3 credits, 3 contact hours (3;0;0).

CET 497. Co-op Work Experience. 3 credits, 3 contact hours (0;0;3).
Restriction: Approval of the department, and permission of the Office of Cooperative Education and Internships. Provides major-related work experience as co-op/intern. Mandatory participation in seminars and completion of requirements that include a report and/or project. Note: Normal grading applies to this COOP Experience.

CIMT 101. Introduction to Concrete. 3 credits, 3 contact hours (3;0;0).
This course is an overview of the concrete industry including historical aspects, the chemistry, properties and uses of concrete, production and delivery, and management of production facilities. Students will also be introduced to concrete construction and contracting, environmental concerns, professionalism, and career opportunities in the concrete industry.

CIMT 205. Concrete Properties and Testing. 3 credits, 4 contact hours (2;2;0).
The effects of concrete-making materials (aggregates, cements, admixtures, etc.) on the properties of fresh and hardened concrete will be studied and analyzed from an applications point of view. Concrete mixture proportioning calculations, statistical analysis of strength tests, and the economics of various concrete mixes will also be discussed.

CIMT 210. Concrete Applications I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CIMT 101 and CIMT 205. This course is the first of two courses designed to provide a detailed study of the many applications of concrete in the construction of buildings, pavements, and other facilities as they relate directly to the concrete industry. Emphasis will be placed on the advantages, disadvantages and unique problems facing the concrete industry and suppliers of materials used in the manufacture of concrete products.

CIMT 305. Concrete Applications II. 3 credits, 3 contact hours (3;0;0).
This course is a continuation of CIMT 210 and focuses on codes, specifications and industry standards as well as the production and delivery issues related to traditional and unique concrete applications.

CIMT 310. Concrete Products and Delivery. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CIMT 210 Concrete Applications I. This course will provide the student with a basic understanding of managing the order and delivery process common to all concrete products. An emphasis will be given to planning, organizing and controlling at both the management level as well as the supervisory level.

CIMT 315. Concrete Construction Methods. 3 credits, 3 contact hours (3;0;0).

CIMT 405. Advanced Concrete Testing and Quality Assurance. 3 credits, 4 contact hours (2;2;0).
Prerequisite: CIMT 205. This course will focus on advanced concrete testing techniques and quality assurance procedures currently used in the industry for traditional and specialty applications.

CIMT 410. Senior Project in CIM. 3 credits, 3 contact hours (3;0;0).
Prerequisite: Senior standing in Concrete Industry Management. The student works on one or more individually selected projects guided by the department staff. The project must be concrete industry related and may include planning, research (library or lab), engineering report and statistical, analytical, or field investigation. Any of these may follow class-inspired direction, or the students may branch out on their own. The project(s) of each student must be completed and professionally presented by assigned due date for appropriate review and recording of accomplishments.

CIMT 491. Special Project in CIM. 1 credit, 1 contact hour (1;0;0).

CIMT 492. Special Project in CIM. 2 credits, 2 contact hours (2;0;0).

CIMT 493. Independent Study. 3 credits, 3 contact hours (0;0;3).

CIMT 497. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Approval of the department, and permission of the Office of Cooperative Education and Internships. Provides major-related work experience as co-op/intern. Mandatory participation in seminars and completion of requirements that include a report and/or project. Note: Normal grading applies to this COOP Experience.

CIMT 498. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).

CMT 332. Structural Systems for Construction Management. 3 credits, 3 contact hours (3;0;0).
Study of the types and behavior of building structural systems using qualitative analysis techniques. Systems to be covered will include those involving structural steel, reinforced concrete, wood and timber, and plain and reinforced masonry. The effect of wind and seismic events on these systems is reviewed.

CMT 414. Environmental Science for Construction Management. 3 credits, 3 contact hours (3;0;0).
An introduction to construction-related environmental topics, including environmental chemistry, geology, ground water hydrology, outdoor air quality, surface water run-off, erosion and sedimentation control, indoor air quality, asbestos abatement, radon remediation, and noise and vibration.

CMT 436. Temporary Structures for Construction Management. 3 credits, 3 contact hours (3;0;0).
Prerequisite: CMT 332. Study of the types of the various temporary systems and structures used in field construction activities, including concrete forming and falsework, sheeting and shoring for excavations, scaffolding, barricades, ladders, and temporary bridges and ramps. Construction safety with respect to the systems is covered.

CMT 452. Mechanical and Electrical Systems for Construction. 3 credits, 3 contact hours (3;0;0).
Study of the different types of water supply, plumbing, fire protection, heating, ventilation, air conditioning and electrical systems commonly employed in residential and commercial buildings. Case studies include an overview of the design of these systems and their installation in the field.
CPT 310. Computer Design Fundamentals for Computer Technology. 3 credits, 4 contact hours (2;2;0).
Restriction: enrolled in the computer technology option. Boolean algebra, gates, combinational and sequential logic. Memory, microprocessor, and I/O control IC's. Sequential bus architecture.

CPT 315. Computer Architecture for Computer Technology. 3 credits, 4 contact hours (2;2;0).

CPT 325. Medical Informatics Technology. 3 credits, 3 contact hours (3;0;0).
Restriction: Junior standing. Medical Informatics (MI) professionals use information technology to benefit the health and human services industry. One of the main challenges is to develop an integrated medical record/information system that links doctors, pharmacists, medical imaging facilities and hospitals. In addition, MI professionals will also develop skills to design and develop support technology for seniors to maintain independent life styles. This includes remote monitoring systems linked to medical professionals, software for support services, and home automation technology.

CPT 330. Software Web Applications for Engineering Technology I. 3 credits, 4 contact hours (2;2;0).
Common software applications using software objects. The use of software objects in the management of programming projects. Projects illustrate concepts.

CPT 335. Networks Applications for Computer Technology I. 3 credits, 4 contact hours (2;2;0).
Prerequisites: C++, Visual Basic, UNIX utilities. Covers common gateway interface (CGI), servers, network protocols, network administration, server and network performance.

CPT 341. Visual Basic.NET for Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisite: Previous programming experience. Creation of windows with text, controls, menus and graphics, events detection, files and objects management, object oriented techniques.

CPT 373. Web App Development for Mobile. 3 credits, 4 contact hours (2;2;0).
Prerequisite: A basic programming course, in addition is recommended an introductory web programming course. Mobile platforms are becoming ubiquitous and software development for these devices is becoming an essential skill for technical professionals. This software/App development course integrates software and web skills with cross platform open source tools that allow developers to write apps for multiple platforms. Course topics will include PhoneGap and open course development software, App layout, CSS (styling) and navigation (transition animations), JavaScript and native functions, geolocation listeners and Asynchronous JavaScript and XML (AJAX) skills. A class project will incorporate skills introduced in this course. Medical informatics majors will design and build an Electronic Medical records Apps. Other projects will be tailored to the interest of other majors.

CPT 395. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Restriction: Approval of the department and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

CPT 401. Senior Project. 2 credits, 2 contact hours (2;0;0).
Prerequisite: MIS 345. Restriction: senior standing in computer technology. Project management and development, scheduling, proposal writing, documentation of software projects, technical presentations. The successful completion of the project consists of research on a recent computer software and/or hardware product, and the application of the findings to the development of a project, which must include a software component. The senior project may be replaced by a cooperative education experience course, subject to advisor's approval.

CPT 425. Medical Informatics Technology II. 3 credits, 4 contact hours (2;2;0).

CPT 430. Software Web Applications for Engineering Technology II. 3 credits, 4 contact hours (2;2;0).
Prerequisite: CPT 330. Common applications using software objects. The use of software objects in the management of programming projects. Projects are used to illustrate concepts.

CPT 435. Networks Applications for Computer Technology II. 3 credits, 4 contact hours (2;2;0).

CPT 440. Visual Basic Applications for Engineering Technology. 3 credits, 4 contact hours (2;2;0).

CPT 450. Computer Graphics for Computer Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: Calculus II, knowledge of the programming language used in the course, check with the instructor. Drawing shapes, curves and text. Colors and areas, point of light, shading. Masking, 2-D drawings and transformations, 3-D drawings and transformations. Animation. Introduction of a popular graphics package. Lab exercises are used throughout to illustrate concepts.

CPT 491. Special Projects in Computer Technology. 1 credit, 1 contact hour (1;0;0).
Restriction: Senior standing in computer technology. The student works on selected projects guided by the department staff.
CPT 492. Special Projects in Computer Technology. 2 credits, 2 contact hours (2;0;0).
See CPT 491.

CPT 493. Special Projects in Computer Technology. 3 credits, 3 contact hours (3;0;0).
See CPT 492.

ECET 201. Circuits I. 3 credits, 4 contact hours (2;2;0).
This first course in Electrical Circuits introduces the student to both DC and AC Circuit Theory. It includes Ohm's and Kirchhoff's Laws for analysis of series and parallel circuits. Series-parallel, ladder and bridge networks are analyzed. Resonance and frequency response are included along with an introduction to AC circuits. Circuit simulations and laboratory experiments are designed to support the theory and obtain measurement skills.

ECET 202. Circuits II. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 201 or ECE 231 and Math 138 or Math 111 This second course in Electrical Circuits expands on Circuit Theory introduced in ECET 201. It includes Ohm's and Kirchhoff's Laws for analysis of series and parallel AC circuits. Series-parallel, ladder and bridge networks are analyzed using AC signals. Resonance and frequency response are included. The basic theory and operation of diodes and transistors, including dc biasing are studied. Circuit simulation and laboratory experiments are designed to support the theory and obtain measurement skills.

ECET 205. Fundamentals of Analog Electronics. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 202 or ECE 232 This course introduces students to the active components used in electronics circuits. It covers the physics, the characteristics, and some applications of semiconductor diodes and transistors. The applications will include amplifiers, rectifiers, op amps, oscillators, and timers. Circuit simulation and laboratory experiments are designed to support the theory and provide measurement skills.

ECET 210. Intro. to Microprocessors and Computer Architecture. 3 credits, 4 contact hours (2;2;0).
Prerequisite: None This is an introductory course in computer architecture and microprocessor applications for students who already have basic knowledge of digital circuit principles. Computer hardware architecture is analyzed, and assembly-language programs are written and run. Computer architecture concepts are applied through the use of assembly software programs for a popular microprocessor family. Theoretical ideas are reinforced by building and testing realistic experimental systems in the laboratory.

ECET 211. Computer Architecture. 2 credits, 4 contact hours (3;1;0).
Prerequisites: ECET 215 and (CS 106 or CS 113 or CS 114 or CS 115 or CS 116). This course covers the fundamentals of computer architecture and organization including processor organization, registers, ALU, memory, and IO. The architecture and design of each element is studied and reinforced during lab. Lab projects may include the design a simple RISC microcomputer using HDL or the use of RISC microcontroller systems to perform basic IO and control functions. HDL and assembly languages are studied.

ECET 214. Introduction to Communications. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 202 or ECE 232. Corequisite: ECET 205 A study of amplitude modulation, frequency modulation, and pulse modulation systems of transmission and reception, including applications of these systems in radio, television and telemetry. Introduces the latest digital communications theory and applications. Computer simulation and laboratory experiments are designed to support the theory and obtain measurement skills.

ECET 215. Introduction to Digital Electronics. 3 credits, 4 contact hours (2;2;0).
The first course in digital electronics develops the fundamentals of the binary system, circuit implementation from Boolean functions and map minimization. Course includes study of combinational logic, sequential logic circuits, flip-flops, counters, and shift register. Computer simulation and laboratory experiments are designed to support the theory and obtain measurement skills.

ECET 300. Circuit Analysis: Transform Methods. 3 credits, 3 contact hours (3;0;0).
Prerequisites: ECET 303 or ECE 232 and MATH 238 or Math 112. Corequisite: MATH 322 or MATH222. The principles, theorems and techniques of circuit analysis are reviewed. The technique of waveform and circuit transforms is introduced. Laplace transforms are studied and applied in the solution of circuit problems with a variety of input functions. Fourier analysis also is introduced. Extensive use of computer simulation software.

ECET 303. Circuit Measurements. 2 credits, 4 contact hours (1;3;0).
Prerequisites: ECET 205 or ECE 271 and MATH 238 or MATH 112. Lecture and laboratory sessions are designed to develop techniques for the measurement of various circuit parameters as well as the theoretical prediction of these parameters. Extensive use of computer simulation software.

ECET 305. Integrated Circuit Applications. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 303 and MATH 238 or MATH 112. Corequisite: ECET 300. Provides a working knowledge of the characteristics and applications of integrated circuits. Topics include how linear ICs work, the most common circuit configurations in which ICs are used, and how to design the most commonly needed circuits with ICs, using manufacturers specification sheets.

ECET 310. Microprocessors I. 3 credits, 4 contact hours (2;2;0).
Prerequisites: Courses in digital logic and introduction to microprocessors (AAS level). Develops a working knowledge of the characteristics and applications of microprocessors. Emphasis is put on the architecture and instruction set of an advanced microprocessor. Representative data handling problems are studied and tested in the laboratory.

ECET 311. Embedded Systems I. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CPT 315 or ECE 251 and ECET 215. Develops a working knowledge of the characteristics and applications of devices used in embedded systems such as microcontrollers. Emphasis is put on the architecture, instruction sets, and assemblers. Representative data handling problems and interfacing are studied and tested in the laboratory using state-of-the art hardware.
ECET 314. Communication Systems. 3 credits, 4 contact hours (2;2;0).
Corequisite: ECET 300. A study of amplitude modulation, frequency modulation, and pulse modulation systems of transmission and reception, including applications of these systems in radio, television, and telemetry. Introduces the latest digital communications theory and applications. Perform appropriate laboratory exercises and projects.

ECET 319. Electrical Systems and Power. 3 credits, 4 contact hours (2;2;0).
Prerequisites: Physics I and Calculus (AAS level). Restriction: For non-ECET majors only. The fundamentals of ac and dc circuit theory are studied. Transistor and diode theory and their applications in amplifiers and filters are investigated. Electrical machines are also included in this course. Computer simulation as well as appropriate laboratories are required.

ECET 329. Analog and Digital Electronics. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 201 or ECE 231. For MET majors only. Building on ECET 201, a study of more advanced topics in electronics including AC circuit analysis, op-amps, transistors, digital logic and microcontrollers. Computer simulation as well as laboratories are required.

ECET 344. Numerical Computing for Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CS 101 or CS 100 or CS 106, or CS 115 and MATH 238 or MATH 112. Corequisite: MATH 309. An introduction to the use of a computer to analyze and solve problems common in engineering. Using computers and the application language students will confront a variety of tasks that will promote an object oriented programming structure. The goal of this course is to understand and program routines commonly used in the design of computer algorithms for computer-based problems. Practical applications as well as mathematical programming are stressed.

ECET 350. Computerized Industrial Controls. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CPT 315 and ECET 311. This course introduces students to the theory and application of computerized control systems and technologies used in industry today. The course focuses on the hands-on development and integration of programmable logic controllers (PLCs), motor controllers (drives), and supervisory software.

ECET 365. Digital Logic and Circuit Design. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ECET 215 or ECE 251 Develops the mathematics and minimization techniques together with the circuit implementation for the design of combinational and sequential digital solid-state logic circuits. Studies decoders, multiplexers, counters, registers, and PLDs. Computer and communications circuits are used as examples. Projects employ computer simulation of digital circuits.

ECET 395. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Restriction: Completion of Freshman year and Approval of the department and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

ECET 400. Senior Project. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 305, ECET 344, ECET 411 and ENG 352. Capstone project course for the ECET program. Students work as a group to design and develop a product. Students must study project management, concurrent engineering, proposal development, research, societal impact, market research, prototyping and testing. Students develop a formal project proposal, Gantt chart and design specifications for their project. Students apply technical knowledge to build and test their project. Documentation and demonstration of formal testing procedures, computer analysis, simulation, time and cost estimates and compliance with specifications is required. Students present a functioning prototype of the project to a design review board and other students enrolled in the course.

ECET 401. ECET Senior Project I. 2 credits, 2 contact hours (2;0;0).
Prerequisites: ECET 344, ECET 305, ECET 411 and ENG 352. The first course in a two-course sequence comprised of Senior Project 1 (ECET 401) and Senior Project 2 (ECET 402). Project management, concurrent engineering, proposal development, library research, and computer usage are stressed. Students develop a formal proposal, technical specifications, Gantt chart, and design specifications for the senior project to be implemented in ECET 402.

ECET 402. ECET Senior Project II. 1 credit, 2 contact hours (0;2;0).
Prerequisite: ECET 401 (The previous semester) Apply technical knowledge to implement, build, and test the project approved in ECET 401. Complete library research, design specifications, computer analysis, simulation, and time and cost estimates. Purchase and build a working prototype of the design. Complete formal testing procedures to verify that the prototype meets design specifications. Submit formal written documentation and present the project during an oral presentation to a design review board and other students in the class.

ECET 406. Control Systems and Transducers. 4 credits, 6 contact hours (3;3;0).
Prerequisite: ECET 305. Class and laboratory study of analog and digital automatic control. Using Laplace transforms, principles of analysis and design of control systems are introduced. Transducer characteristics and their application in instrumentation and control are investigated. Several experiments are implemented using Programmable Logic Controllers (PLCs).

ECET 410. Microprocessors II. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 310 and ECET 365. Covers the operations, board boarding, and interfacing of devices peripheral to microcomputers. Emphasizes embedded applications of microprocessors to systems requiring both hardware and software development. Advanced topics include programmable peripheral I/O controllers, interrupts and local ISA, PCI and USB buses.

ECET 411. Embedded Systems II. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 311 and ECET 365. This course is the second of two embedded systems courses. The primary objective is to prepare students in the ECET curriculum to design embedded systems as part of senior project and also in industry. The design of embedded systems is investigated at the hardware and software level with an emphasis on processor and system architecture. The C language is used for programming.
ECET 412. Power Generation and Distribution. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 205 or ECE 271 Electrical generation, transmission, and distribution systems with an emphasis on 3 phase analysis, design, short circuit currents due to symmetrical faults, and reliability considerations of the electric power system. The laboratory portion includes hands-on activities and experiments that align electric power theory with application. Design considerations for inside / outside plant, worker safety, system interconnection and protection, while focusing on reliability and cost considerations are covered.

ECET 415. Fundamentals of Telecommunications. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 214. The focus of this course is on network data communication systems and related protocols. Main topics include transmission media including coax, twisted pair, fiber optics, wired, and wireless media. The Transmission Control Protocol/Internet Protocol (TCP/IP) model as well as the Open System Interface (OSI) model are discussed with emphasis on the details of the TCP/IP model. Additional topics such as wired and wireless LAN, backbone networks, wide area networks, The Internet, networking security, and networking design are covered.

ECET 416. Networking Applications. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 344. Introduces students to the technology of networking with a particular focus on local area networks and the protocols associated with network communication. Comprised of two components: concept/theory and hands-on/applications in the laboratory. Topics include: an overview of network communication systems, networking concepts, network protocols, network standards, wide area networks, local area networks, enterprise networks, network topology, media access control, transport control protocol, internet protocol, and routing. Students learn to analyze traffic flow on network links and how to write network based software applications.

ECET 418. Transmission Systems. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 214. A study of wireless and terrestrial transmission systems with an emphasis on fiber optics and the latest wireless techniques. The lectures examine the technologies as well as the advantages and disadvantages of the various transmission techniques. The laboratories are a mixture of fiber optic, microwave, and wireless experiments providing hands-on experience in these important areas.

ECET 440. Clinical Internship. 3 credits, 3 contact hours (3;0;0).
By Advisement*. Consists of 200 hours of experience in the clinical engineering department of a hospital. The student is under the supervision, and is evaluated by, the director of clinical engineering at the hospital. A final report is submitted to and graded by the NJIT faculty advisor.

ECET 444. Technology Applications of Object-Oriented Programming. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ECET 344. Brings together prior software knowledge and applies it to develop modern software applications. Comprised of theory and hands-on applications in the lab. Concepts in modular/structured design and object-oriented design will be combined to develop modern internet and database connected applications. Examine several case studies during the last few weeks. Design, construct, and test a practical software project.

ECET 491. Special Projects in ECET. 1 credit, 3 contact hours (3;0;0).
By Advisement*. Special projects course for ECET students with subject matter to be arranged by instructor and approved by program coordinator.

ECET 492. Special Projects in ECET. 2 credits, 3 contact hours (3;0;0).
By Advisement*. See ECET 491.

ECET 493. Special Projects in ECET. 3 credits, 3 contact hours (0;0;3).
By Advisement*. See ECET 491.

ECET 495. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisite: ECET 395. Provides major-related work experience as a co-op/intern. Mandatory participation in seminars and completion of requirements that include a report and/or project.

ET 101. Introduction to Engineering Technology. 0 credits, 2 contact hours (2;0;0).
This course introduces the student to engineering technology. Also included is an introduction to the various engineering technology options: Construction, Electrical and Computer, and Mechanical Engineering Technologies as well as Concrete Industry Management.

MET 103. Engineering Graphics and Intro. to CAD. 2 credits, 3 contact hours (1;2;0).
A first course in Computer Aided Design (CAD), includes lab work using AutoCAD software. Topics include fundamentals of engineering graphics, AutoCAD command structure, setting units and limits, drafting primitives, layering, use of editing tools; grid, snap, and axis commands. Upon successful completion of this course, students should be able to effectively produce two-dimensional drawings using the AutoCAD software program.

MET 105. Applied Computer Aided Design. 2 credits, 3 contact hours (1;2;0).
Prerequisite: MET 103. A second course in Computer Aided Design (CAD), additional AutoCAD topics include blocks, move and copy, array, mirror, text, text styles, 3D and isometric modes. Upon successful completion of this course, students should be able to use advanced AutoCAD commands to quickly and efficiently produce 2D and 3D drawings, and also be able to modify the AutoCAD environment (e.g., menus, macros, etc.) to boost productivity.

MET 205. Advanced Computer Aided Design. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 105. This course introduces advanced CAD applications, including attribute and attribute extraction, external reference files, solid modeling, surface rendering and animation. Upon successful completion of this course, students should be able to use a CAD software package to develop animations consisting of 3D models with rendered surfaces.

MET 235. Statics for Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS 102 and MATH 238. Provides an understanding of equilibrium of particles and rigid bodies subject to concentrated and distributed forces. Upon successful completion of this course, the students should be able to analyze problems involving the equilibrium of particles and rigid bodies, including simple machines, trusses, and frictional forces.
MET 236. Dynamics for Technology. 2 credits, 2 contact hours (2;0;0).
Prerequisite: MET 235 or MECH 235. Provides an understanding of the mathematics of the motion of particles and rigid bodies, and of the relation of forces and motion of particles. Upon successful completion of this course, the students should be able to describe the motion of particles and rigid bodies as functions of time and position, develop their equations of motions due to applied forces, and determine post impact behavior.

MET 237. Strength of Materials for Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 235 or MECH 235. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structured problems, and an understanding of the mechanical behavior of materials under various load conditions. The laboratory experience is integrated within the course. Upon successful completion of this course, the students should be able to determine stresses and deformations for a variety of simple structural problems.

MET 301. Analysis and Design of Machine Elements I. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MATH 238, MET 236, MET 237, CS106. The principles of strength of materials are applied to mechanical design. Topics include theory of failure, stress concentration factors and fatigue, the design and analysis of shafts subjected to static and dynamic loadings, and critical speed of a rotating shaft.

MET 302. Analysis and Design of Machine Elements II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MET 301. A continuation of MET 301, including analysis and design of power screws, brakes, clutches, belts, chain drives, gears, gear trains, bearings, and other machine elements.

MET 303. Applied Thermodynamics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 238 or MATH 112, PHYS 103 or PHYS 121, CS 106. Basic principles of thermodynamics and their applications to internal combustion engines, turbines, compressors, power generating and refrigeration systems.

MET 304. Applied Fluid Mechanics. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MATH 238 or MATH 112, PHYS 103 or PHYS 121. An introduction to fluid statics and the basic laws of fluid flow; conservation of mass, momentum and energy. Applications of the basic laws to internal and external incompressible flow, including specific topics in pipe flow systems, centrifugal pumps and fans, streamlining, and fluid flow meters.

MET 307. Plastics Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CHEM 301, MET 215, MET 237, MET 105. An introduction to the basic concepts of plastics conversion, resin classification, processing techniques and significant engineering properties.

MET 308. Plastics Processing Techniques. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MET junior standing, MET 307. A study of the various processing techniques for both thermoset and thermoplastic materials. Topics include extrusion, injection molding, blow molding, compression moldings, and casting processes.

MET 314. Dynamics of Machinery. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MET 236, MET 237, MATH 238, MET 105, CS 106. Acquaints students with motion and forces in machines. Topics include velocity and accelerations in linkages, gears, cam and gear trains, static and dynamic forces, and torques in linkages.

MET 395. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisite: MET JUNIOR STANDING. Students gain major-related work experience and reinforcement of their academic program. Work assignments facilitated and approved by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

MET 401. Mechanical Design Project I. 2 credits, 2 contact hours (2;0;0).
Prerequisites: MET 302, MET 303, MET 304, MET 314, ECET 329, ENG 352. Project and lecture applies the principles learned in all technical courses to more advanced design situations. Proposal of a typical mechanical engineering system is presented by an individual or by small groups. The proposal must meet the approval of course instructor. A formal proposal is required.

MET 403. Applied Thermodynamics II. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MATH 309, MET 303 or its equivalent, MET 304. Builds on a first course on thermodynamics and covers thermodynamic properties of steam, first and second law of thermodynamics. Topics include power and refrigeration cycles, psychrometric chart and combustion.

MET 404. Applied Heat Transfer. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MATH 309, MET 303, MET 304. An introduction to the fundamental theories and applications of heat transfer. Emphasizes understanding and practical problem solving in covering the three fundamental modes of heat transfer: conduction, convection, and radiation.

MET 407. Structural Design. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MET 237, CS 106, MATH 238, MET 105. Acquaints students with the fundamentals of structural design. Topics include analysis and design of structural members due to various loadings (tension, compression, bending, torsion, and shear), deflections of structural members, truss analysis, stress analysis of weldment.

MET 409. Air Conditioning and Refrigeration. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MET 303, MET 304. Calculation of building cooling and heating loads, psychrometric charts, air distribution and duct design. Topics also include compression and absorption refrigeration cycles, automatic control of refrigeration systems, and building energy management.

MET 415. Automatic Control Systems. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 201, MET 302, CS 106, MET 105. Introduction to programmable logic controllers (PLC) as a tool for industrial controls of machines and process. Includes selections of hardware and software, ladder logic programming, wiring methods, maintenance and trouble shooting of.
MET 440. Mechanical Design Project II. 1 credit, 2 contact hours (2;0;0).
Prerequisite: MET 401. Continuation of project MET 401. Oral presentation and formal written report are required.

MET 450. Mech Design Capstone Project. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MET 302, MET 303, MET 304, MET 314, ECET 329, ENG 352. Project and lecture applies the principles learned in all technical courses to more advanced design situations. Proposal of a typical mechanical engineering system is presented by an individual or by small groups. The proposal must meet the approval of course instructor. A formal proposal is required.

MET 491. Special Projects in MET. 1 credit, 3 contact hours (3;0;0).
One-credit special project course for MET students. Must have an instructor agreeing to sponsor the project. Approval by program coordinator is required.

MET 492. Special Projects in MET. 2 credits, 3 contact hours (3;0;0).
Two-credit special project course for MET students. Must have an instructor agreeing to sponsor the project. Approval by program coordinator is required.

MET 493. Special Projects in MET. 3 credits, 3 contact hours (3;0;0).
Three-credit special project course for MET students. Must have an instructor agreeing to sponsor the project. Approval by program coordinator is required.

MET 495. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisite: MET 395. Approval of the department, and permission of the Office of Cooperative Education and Internships. Full-time work experience for approximately one semester. Provides major-related work experience. Mandatory participation in seminars and completion of requirements that include a report and/or project.

MIT 231. Intro to Comp Security: Med Dev. 3 credits, 4 contact hours (2;2;0).
Prerequisites: An introductory Computer Programming Course: CS 100 or CS 106 and IT 120. Medical devices and systems are uniquely vulnerable to hacking and intrusion due to the nature of architecture: i.e. usually a dedicated device designed to solve a limited medical application such as an infusion pump that delivers medications in measured dosages. These systems rarely have more than a minimal computer footprint with limited or no operating system, i.e. a dedicated controller, and are usually updated periodically wirelessly. Our increased reliance on life sustaining technology required that computer professionals and engineers are educated on the evolving issues and solutions to these potentially life threatening dangers.

MIT 326. Electronic Medical Record Design. 3 credits, 4 contact hours (2;2;0).
This course will prepare students to manage medical records and related information in different medical settings like individual/group medical practices, health care organizations, long-term care settings, insurance companies, health-care software consulting companies, and/or government agencies. This course will also enable Medical Informatics student interns to become well versed in technology used during their internships. This course has two main objectives; first planning for Electronic Medical Record (EMR) adoption and implementation, and second, practical techniques of implementing and customizing Electronic Medical Records.

MIT 360. Introduction to Gerontology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: Junior level standing, R920 201 or R830 101. Introduction to Gerontology is an introduction to the field of human aging. The course of study will include a multidisciplinary examination of the way in which human aging is viewed and how we perceive the process of growing older and how society responds to the issues of aging. The class will look at aging from multiple perspectives that include the social, political and biological sciences, arts and humanities, care giving and social services. This proposed course will provide students with an understanding of the unique challenges individuals experience as they age. Second it provides some basic hands/labs covering assistive technologies and personal and mobile sensors.

MIT 362. Geriatric Engineering I. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MIT 360 and (CS 106 or CS 113 or CS 115 or CPT 341) and (MATH 305 or MNET 315.) This course will first provide students with an understanding of the unique challenges individuals experience as they age. It introduces system design techniques to facilitate assistive technologies that foster independent living. The course provides a labs for the emerging field of designing assistive technologies and personal and mobile sensors. Labs will incorporate A hands low-power small footprint computing devices for sensor monitoring. Students will explore the feasibility of using, for example Raspberry Pi, and Arduino platforms, to monitor vital signs and export data to Electronic Health Record (EHR) platforms. Big Data challenges will be explored in preparation for meaningful use applications required by all EHR systems.

MIT 440. Clinical Internship. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Junior Level Standing, CPT 325 and permission MIT program coordinator. During the course of a semester the student gains 100 hours of experience in the IT or Network and Security department of a hospital. The student is under the supervision, and is evaluated by, the director of the corresponding program at the hospital. A final report is submitted to and graded by the BS, MIT Program Advisor at NJIT.

MNET 300. Concepts In Machining. 3 credits, 4 contact hours (2;2;0).
Prerequisite: ME 215. Applications in the machining of various materials. Topics include speeds and feeds calculations, tooling concepts, gaging techniques and prototype construction.

MNET 303. Advanced Techniques in CAD/CAM. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 105. Applications including hands-on experience with CAD/CAM systems. Emphasis is on understanding how displayed objects are represented and manipulated on the computer. Laboratory experiences contribute to an understanding of the advantages and limitations of CAD/CAM systems.
MNET 315. Industrial Statistics. 3 credits, 4 contact hours (2;2;0).
Introduction to statistics covering data collection, analysis and presentation. Specialized topics include probability, control charts, correlation, regression, hypothesis testing, and experimentation.

MNET 318. Mfg Process Design. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MNET 303. A development of the principles of production, methodology and economics in view of production requirements with respect to materials, tolerances and finish. Production processes are matched to the product requirements. Laboratory work supports the lecture. Computer problem solving is incorporated in the course.

MNET 395. Coop Experience I. 3 credits, 3 contact hours (0;0;3).
Prerequisites: Completion of the sophomore year, approval of the department, and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Work assignments are facilitated by the co-op office. Mandatory participation in seminars and completion of a report. Note: Normal grading applies to this COOP Experience.

MNET 405. Numc Control Machn Tools. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MNET 300 or equivalent. Fundamental concepts of numerical control systems. Assignments include mill and lathe programming techniques, sheet metal processing, and CNC economics.

MNET 414. Industrial Cost Analysis. 3 credits, 3 contact hours (3;0;0).
An introduction to general costing techniques. Time value of money concepts are introduced to decision-making matters such as equipment justification, design selection and fabrication costs.

MNET 416. Production Scheduling. 3 credits, 3 contact hours (3;0;0).
Prerequisite: MNET 315. A study of manual and computerized methods for setting schedules. Gantt charts, CPM, PERT, PERT/COST, and Line of Balance are some of the topics treated. Problems of line balancing and machine loading are discussed.

MNET 420. Quality Systems. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MNET 315. Introduction in quality control that emphasizes design quality, total quality management and statistical process control. Additional topics include quality economics, ISO, reliability, service quality, measurement and acceptance sampling.

MNET 421. Contracts & Specs. 3 credits, 3 contact hours (3;0;0).

MNET 422. Tool Design. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MNET 300 and MNET 303. Introduction to the design of cutting tools with emphasis on speeds, feeds, and power requirements. Covers design of jigs, fixtures, punch and dies, gaging and inspection tooling with emphasis on current industrial practices.

MNET 423. Motion & Time Study Tech. 3 credits, 4 contact hours (2;2;0).
A study of the basic principles of motion study concerning workplace design and related techniques involving process analyses, man-machine charts and micromotion study. Covers stopwatch time study techniques as well as predetermined time standards, work sampling and wage incentive system.

MNET 425. Advanced Manufacturing Rotation. 2 credits, 4 contact hours (3;1;0).
Prerequisites: MET 237, MNET 300, MNET 315, MNET 318. The course applies the principles learned in all technical courses to an Advanced Manufacturing environment. The student will rotate under the various manufacturing/metrology areas within an Advanced Manufacturing facility. Progress reports, oral presentation and a formal written report are required.

MNET 426. Manufacturing Project. 2 credits, 4 contact hours (1;3;0).
Prerequisite: Senior standing. A capstone project requiring a formal written report and oral presentation.

MNET 495. Cooperative Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: MNET 395 or its equivalent, approval of the department, and permission of the Office of Cooperative Education and Internships. Provides major-related work experience as a co-op/intern. Mandatory participation in seminars and completion of requirements that include a report and/or project.

SET 200. Introduction To Geomatics. 3 credits, 3 contact hours (3;0;0).
Plane surveying with angle and distance measurements; leveling; topographic mapping; traverse and area computations; horizontal and vertical curves; cross sections; triangulation; state plane coordinates; 3-D surveying using Global Positioning System (GPS), Geographic Information Systems (GIS) and remote sensing technology for surveying and mapping applications. Emphasis is on the use of the computers for solving typical field and office problems.

SET 200A. Introduction to Geomatics Lab. 1 credit, 3 contact hours (0;3;0).
Co-requisite: SET 200 or department permission. Field exercises in conjunction with the classroom exercises utilizing classical and electronic surveying instruments and COGO/CAD software.

SET 203. Intro to Remote Sensing Sci &. 3 credits, 3 contact hours (3;0;0).
This course provides an introduction to remote sensing (RS), emphasizing the techniques that are used to monitor the Earth’s surface. It will introduce the fundamentals of electromagnetic radiation (EMR), principles and concepts of RS, and EMR measurement by air- and space-borne optical, thermal, radar and LiDAR instruments, as well as Unmanned Aerial Vehicles (UAVs). The main theme will be how qualitative and quantitative information from RS data are acquired, processed, analyzed and utilized.
SET 207. Evidence and Procedures for Property Surveys. 3 credits, 3 contact hours (3;0;0).
Co-requisites: CE 200, SET 200 or permission of instructor. Introduction to surveying law and to the concept of evidence related to boundary locations as discoverable on the ground and through deeds or other written records. Understanding of the principles of property law, titles, land ownership, transfer of land ownership, deed descriptions, evidence recovery and conflict resolutions.

SET 280. Marine Surveying. 4 credits, 6 contact hours (3;3;0).
Prerequisite: CE 200 or SET 200. Marine Surveying builds on the core competencies introduced in "Introduction to Geomatics". This course focuses on computer generated solutions for nautical charts and water boundary delineations using imaging, optical, LiDAR, and acoustic observations via marine, airborne, and space-based platforms; to understand marine surveying technology for solutions on environmental problems; develop skills and techniques to enhance, interpret, and analyze acoustic measurements using computer-based methods.

SET 301. Route Surveying. 4 credits, 6 contact hours (3;3;0).
Co-requisites: CE 200, SET 200 or equivalent, or permission of instructor. Horizontal and vertical curves computation and layout with regard to highway design. Special emphasis on complex curves. Topics include control, positioning, error analysis, highway design problems, and layout. Concepts of right-of-way surveys. Also included is an introduction on the concepts of machine control.

SET 302. Geodetic Control Surveying. 4 credits, 6 contact hours (3;3;0).
Co-requisites: CE 200, SET 200 or equivalent, or permission of instructor. A study of the higher order methods and techniques of surveying such as Global Positioning System (GPS) with observations of Real-Time networks, 1st, 2nd and 3rd Orders of Accuracy along with the requisite computations to reduce these observations to measurements and the applications of these measurements to the State Plane Coordinate systems and the geoid.

SET 303. Photogrammetry and Aerial Photo Interpretation. 4 credits, 6 contact hours (3;3;0).
Prerequisite: CE 200 or equivalent. A review of the principles of photography, including the physical science of optics as related to the use of aerial photos, to engineering and land surveying projects. Includes the necessary mathematics of photogrammetry and the process of designing and establishing the required data for proper acquisition of photogrammetric information.

SET 304. Adjustment Computations I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: Calculus I or equivalent. A course designed to give the student the necessary knowledge to reduce survey observations to measurements; to analyze the data to determine the relationship of adjusted measurements to the observations; to verify that the mathematical constraints have been met; and to introduce approximate and least squares adjustments of surveying observations.

SET 307. Boundaries and Adjacent Properties. 3 credits, 3 contact hours (3;0;0).
Prerequisites: SET 207 or equivalent, or permission of instructor. A course on legal principles regarding boundaries and the constructive solutions of the problems of boundary surveying by a consideration of deed descriptions and examples of their application to surveying.

SET 360. Digital Surveying Methods. 3 credits, 3 contact hours (3;0;0).
The goal of this course is that students will be taught skills in using robotic and digital geospatial data collection technologies for mapping using Computer Aided Drafting (CAD) methods. The course has three parts. Part 1 deals with data collection, where both analogue and digital data collectors of field observations are covered. Methods focus on approaches that minimized the contribution for operator and instrument errors on the observations. In part 2, emphasis is on data preparation, reductions, and processing for coordinate computations. Part 3 focuses on CAD methods for preparing as-built site plans, plat or survey diagram, survey work plan, CAD modeling capabilities to construct a Digital Elevation Model (DEM) or a Digital Surface Model (DSM), topographic mapping outputs, and construct GIS layers from survey data. The emphasis of this course is on hands-on exercises in the practice of geospatial data collection, handling instrumentation, data processing and data representation.

SET 401. Fundamentals Of Geodesy. 3 credits, 3 contact hours (3;0;0).
Prerequisite: SET 302 and SET 303. Geodesy and its relation to surveying and other disciplines. Topics include geometric, physical and satellite geodesy. Also includes the concept of map projection.

SET 403. Remote Sensing Principles for Geomatics. 3 credits, 3 contact hours (3;0;0).
Prerequisites: CE 200 or SET 200. Principles of remote sensing for Geomatics application build on the core competencies introduced in Introduction to Surveying. This course focuses on computer generated solutions from technologies used for the acquisition and production of geospatial data via terrestrial, airborne, and space-based platforms; to understand remote sensing technology for solutions on scientific environmental problems; develop skills and techniques to enhance, interpret, and analyze digital imagery using computer-based methods.

SET 404. Adjustment Computations II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: SET 304. Concepts of survey observations for adjustment and estimation models. A continuation of the theory of least squares and the mathematical weighting of observations. Also includes the statistical evaluation of least squares results with hands-on training using state-of-the-art industry standard software.

SET 407. Boundary Line Analysis. 4 credits, 6 contact hours (3;3;0).
Prerequisite: SET 307. Develops the analytical synthesis of real property law, land surveying procedures, and scenario development compatible with current case law decisions for the development of most probable scenarios of boundary location for the court's consideration.

SET 420. Geographic/Land Information Systems. 4 credits, 6 contact hours (3;3;0).
Prerequisites: SET 307 or MET 205 or permission of instructor. Geographic/Land Information System builds on the core competencies that were introduced in the course "Introduction to Surveying". This course focuses on understanding the fundamentals of Geographic/Land Information Systems (GIS/LIS) and Multi-Purpose Cadastres. Topics on LIS emphasize issues relating to the design, implementation, and maintenance of land records. Topics on GIS emphasize GIS data models (vector versus raster) and database development for applications in diverse fields like criminal justice, economics, and infrastructure. Students will learn practical skills on web-based mapping and GIS.
SET 423. Remote Sensing of the Environment. 3 credits, 3 contact hours (3;0;0).
This course focuses on various aspects of remote sensing applications in the domain of natural resources. Students will have the opportunity to
obtain hands-on experience through real-world applications of remote sensing technologies in the biosphere, the hydrosphere, the pedosphere,
the atmosphere, and the built environment. Students will come out of this course with a mastery of a wide range of interpretation, measurement,
environmental monitoring and mapping skills using remotely sensed data.

SET 433. Remote Sensing Digital Image. 3 credits, 3 contact hours (3;0;0).
This course introduces conceptual and practical aspects of digital image analysis from airborne and spaceborne earth-observing instruments, and
provides up-to-date information on analytical methods used to analyze digital remote sensing data. The project-based course will emphasize the
advanced techniques for remote sensing data processing and analysis. In-class exercises will give students hands-on experience in the fundamentals of
digital image processing and information extraction techniques.

SET 440. Land Development. 3 credits, 3 contact hours (3;0;0).
Prerequisite: SET 207 and CE 321 or equivalent. Understanding the process of development of land through the study of land use law, federal, state
and municipal land use regulations, federal and state regulations regarding environmental issues and the administrative and statutory laws governing the
preparation of land surveys; impart the ability to prepare a land survey from initial contact and the proposal phase to preliminary and final plan approval
through a class project designed to cover all of these phases.

SET 490. Senior Project in Surveying. 2 credits, 2 contact hours (2;0;0).
Prerequisite: Senior standing. The student works on an individual surveying project guided by the department staff. The project should concentrate on a
specific aspect of surveying, not necessarily on field measurements. Project includes library research, written report and oral presentation of findings.

SET 491. Special Projects in Surveying. 1 credit, 1 contact hour (0;0;1).
This course provides students with research experience in Geomatics/Surveying at the undergraduate level. Course content and scope of study
will be approved by the coordinator of the SET program. Topics can include GPS data processing, marine surveying for bathymetric modeling and
generalization, and geophysical surveying using gravity and topography data. Course outcomes include knowledge of advanced data processing, data
analysis, and interpretation at the undergraduate level.

SET 492. Special Projects in Surveying. 2 credits, 2 contact hours (0;0;2).
This course provides students with research experience in Geomatics/Surveying at the undergraduate level. Course content and scope of study
will be approved by the coordinator of the SET program. Topics can include GPS data processing, marine surveying for bathymetric modeling and
generalization, and geophysical surveying using gravity and topography data. Course outcomes include knowledge of advanced data processing, data
analysis, and interpretation at the undergraduate level.

SET 493. Special Projects in Surveying. 3 credits, 3 contact hours (0;0;3).
This course provides students with research experience in Geomatics/Surveying at the undergraduate level. Course content and scope of study
will be approved by the coordinator of the SET program. Topics can include GPS data processing, marine surveying for bathymetric modeling and
generalization, and geophysical surveying using gravity and topography data. Course outcomes include knowledge of advanced data processing, data
analysis, and interpretation at the undergraduate level.

TMT 301. Digital Electronics for Telecommunications. 3 credits, 4 contact hours (2;2;0).
Studies the fundamentals of digital electronics including combinational and sequential logic. Emphasizes those signals and configurations commonly
employed in telecommunication systems. Theory is reinforced in hardware and simulation laboratory exercises.