SAET - Elec. & Mech. Division (SEMD)

On November 9, 2018, NJIT launched its newest school, the School of Applied Engineering and Technology (SAET), within the university's Newark College of Engineering (NCE). SAET encompasses NCE's applied programs in four divisions: the Electrical and Mechanical Engineering Technology Division (SEMD), the Built Environment Division (SBED), the Engineering Education Division (SEED), and the Biomedical & Life Sciences Division (SBLD). SAET serves about 1,000 NJIT students. The SAET offers a Bachelor of Science (BS) in Engineering Technology with five different concentrations. In addition, SAET offers BS degrees in Construction Engineering Technology (CET), Concrete Industry Management (CIM), Electrical and Computer Engineering Technology (ECET), Industrial Engineering Technology (IET), Mechanical Engineering Technology (MET), and Surveying Engineering Technology (SET). SAET also offers a BS degree in General Engineering (GEN) with five different concentrations, a Master of Science (MS) in Engineering Science (ESC), and a doctoral degree (PhD) in ESC.

The Electrical and Mechanical Engineering Technology Division (SEMD) consists of the Electrical and Computer Engineering Technology (ECET), Industrial Engineering Technology (IET), and Mechanical Engineering Technology (MET) programs. In addition, SEMD administers the BS in Engineering Technology, Concentration in Software and Data Engineering Technology (SDET) program found in the Engineering Education Division (SEED). The programs in Electrical and Computer Engineering Technology (ECET) and Mechanical Engineering Technology (MET) are accredited by The Engineering Technology Accreditation Commission, ETAC of ABET, http://www.abet.org (http://www.abet.org/) under the General Criteria and the Program Criteria.

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 School of Applied Engineering and 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 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.

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

S

Sengupta, Arijit, Associate Professor

W

Washington, David W, Associate Professor

Wiggins, John, Senior University Lecturer

Programs

- Electrical and Computer Engineering Technology - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-semd/electrical-computer-engineering-technology/)
- Industrial Engineering Technology - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-semd/manufacturing-engineering-technology/)
- Mechanical Engineering Technology - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-semd/mechanical-engineering-technology/)

Geriatric Engineering Technology Minor (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-semd/geriatric-minor/)

Grand Challenges of Engineering Minor (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-semd/grand_challenges_of_engineering_minor/)

Manufacturing Engineering Technology Minor (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-semd/manufacturing-engineering-technology-minor/)

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.

ECET 201. Circuit Analysis DC and AC. 3 credits, 4 contact hours (2;2;0).
This course in Electrical Circuits introduces the student to both DC and AC Circuit Theory. It includes Ohm's and Kirchoff's Laws for analysis of series and parallel circuits. Series-parallel, ladder and bridge networks are analyzed. Capacitors, inductors, and transformers are studied along with RLC circuits, frequency response and resonance. 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).
Prerequisites: ECET 201 or ECE 231. 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 and Embedded Systems. 3 credits, 4 contact hours (2;2;0).
Prerequisites: (CS 100 or CS 106 or CS 113 or CS 114 or CS 115 or CS 116 or SDET 101) and ((ECET 201 and ECET 215) or SDET 102). 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, C, and Python languages may be used and studied.

ECET 214. Introduction to Communications. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 202 or ECE 232. Corequisites: ECET 205 or ECE 271. 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 230. Electronics Design for Manufacturing and Production. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 205. This course teaches the fundamental skills required to design and manufacture electrical systems on printed circuit boards. The fundamental skills of electronics CAD are taught along with industry standards for schematic designations, engineering change orders, component packaging, simulation, and verification. Students are taught basic and advanced topics in PCB construction, analysis, and layout including auto-routing with a focus on through hole and surface mount technology, impedance control, heat dissipation, interconnects, panelization techniques, and production specific features and designations. Manufacturing files and outputs are studied emphasizing the necessary considerations for mass production, testing, component selection, stencil designs, solder composition, and reliability concerns.

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). Corequisites: MATH 322 or MATH 222. 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 138 or MATH 111). 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). Corequisites: ECET 300 or ECE 333. 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: (CS 100 or CS 106 or CS 113 or CS 114 or CS 115 or CS 116 or SDET 101) and (ECET 211 or ECE 252) and (ECET 215 or ECE 251) and (ECET 205 or ECE 271 or SDET 201). 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 recep-tion, 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).
Prerequisites: ECET 201 or ECE 231 or ECE 405. Restrictions: This course may not be taken by ECET majors and is designed specifically for non-ECET majors. 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 100 or CS 106 or CS 113 or CS 114 or CS 115 or CS 116) and (MATH 238 or MATH 112). 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: (ECET 211 or CPT 315 or ECE 252) and ECET 311. Restrictions: Junior or Senior Standing. 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, mulitplexers, 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.

ECET 400. Senior Project. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 305 and ECET 344 and ECET 411 and COM 313. 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 COM 313. 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, bread boarding, and interfacing of devices peripheral to microcom-puters. Emphasizes embedded applications of microprocessers 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. 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).
Prerequisites: ECET 205 or ECE 271. Restrictions: Junior or Senior Standing. 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 414. Solar Photovoltaic Site Planning and System Installation. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 205 or ECET 329 or ECE 271. Restrictions: Junior or Senior Standing. This course covers the following topics on solar photovoltaic (PV) systems: introduction to renewable energy and PV systems, solar thermal systems, solar radiation, sun path characteristics, panel installation, and troubleshooting. Moreover, the identification and analysis of a PV array site as well as the development of a site layout are discussed with emphasis on the implementation of the associated electrical codes and safety rules. This course will prepare the students for the North American Board of Certified Energy Practitioners (NABCEP) test for certified solar PV system installer.

ECET 415. Fundamentals of Telecommunications. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CS 100 or CS 106 or CS 113 or CS 114 or CS 115 or CS 116. Restrictions: Junior or Senior Standing. 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).
Prerequisites: (CS 100 or CS 106 or CS 113 or CS 114 or CS 115 or CS 116) and ECET 415. Restrictions: Junior or Senior Standing. 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. Restrictions: Junior or Senior Standing. 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 419. Design of Internet Based Embedded Systems. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ECET 411. Restrictions: Junior or Senior Standing. This course explores the fundamental technologies required to build modern embedded systems that are utilized and controlled over the internet. Students learn the basics of foundational internet technologies and data structures such as IoT basics, HTTP requests and response methods, REST web service structures, client/server model topologies, JSON data representation, apache web server, HTTP / IP routing basics, PHP, MySQL, and linux basics. The course explores combinations of these technologies to form complete client/server communication systems that are specifically design for control and utilization of embedded systems using web based communication. The course concludes with a final project where students design an internet based embedded system that can be controlled, monitored, and utilized over the internet.

ECET 435. Digital Signals: Processing, Presentation, and Management. 3 credits, 4 contact hours (2;2;0).
Prerequisites: (CS 100 or CS 106 or CS 113 or CS 114 or CS 115 or CS 116) and (MATH 138 or MATH 111). Restrictions: Junior Standing or Department Approval. This course covers the fundamentals of digital signal processing including signal acquisition, manipulation, and presentation. MATLAB, Python, and Excel are used as methods of computer programming, automation, and signal processing. Students learn the fundamentals of signal sampling, processing, reconstruction, digital signal types, quantization, encoding, FIR and IIR and filters, and various methods for the design of digital signal filters based on use cases and specifications. Emphasis is placed on effective data presentation techniques. The course concludes with a final project which can be implemented in hardware or software.

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. Restrictions: Junior or Senior Standing. 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.

MET 103. Introduction to Engineering Technology Design. 2 credits, 3 contact hours (1;2;0).
This course introduces the engineering design process. Students will be introduced to researching an idea, developing design criteria/constraints, concept design, project management techniques, and realization methods. The fundamentals of technical communication will be introduced with topics in engineering graphics, Computer Aided Design (CAD), and engineering/industrial standards. At the conclusion of the course, students are expected to develop and communicate a design project that meets their established criteria.

MET 105. Applied Computer Aided Design. 2 credits, 3 contact hours (1;2;0).
This course applies Computer Aided Design (CAD) and technical communication to diverse Engineering Technology career paths. Students will explore several topics including engineering graphics, 2D and 3D CAD, technical drawings, dimensioning/tolerancing, and engineering/industrial standards. Upon successful completion of this course, students are expected to identify and apply these areas to the relevant industry sector.

MET 205. Advanced Computer Aided Design. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 103. This course introduces advanced topics in engineering design utilizing Computer Aided Design (CAD). This includes 3D modeling, design intent, engineering drawings, and geometric dimensioning and tolerancing (GD&T). Upon successful completion of this course, students should be able to use CAD as a design tool for both individual parts and assemblies.

MET 235. Statics for Technology. 3 credits, 3 contact hours (3;0;0).
Prerequisites: PHYS 102 or PHYS 111. Corequisites: MATH 138 or MATH 111. 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).
Prerequisites: (MET 235 or MECH 234 or MECH 235), and (MATH 138 or MATH 111). 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).
Prerequisites: (MET 235 or MECH 234 or MECH 235), and (MATH 138 or MATH 111). 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 or MATH 112, and MET 237 or MECH 237. 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, 4 contact hours (2;2;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 138 or MATH 111 and PHYS 103 or PHYS 121. This course provides students with a clear understanding and a firm grasp of the basic principles of Thermodynamics that deals with energy. Topics are the first and the second laws of thermodynamics, physical properties of pure substances, energy analysis of closed system, and mass and energy analysis of control volumes.

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 or CHEM 126 or CHEM 122), and (MET 105 or FED 101), and (MET 237 or MECH 237). 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 or MECH 236, and MATH 238 or MATH 112, and MET 105 or FED 101. 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).
Restrictions: 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.

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, COM 313. 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: MET 303. 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 or MATH 211 or MATH 213), and MET 303, and 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: MATH 238 or MATH 112, and MET 237 or MECH 237, and MET 105 or FED 101. 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. AirConditioning 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 or ECE 405), and (CS 106 or CS 100 or CS 101 or CS 113), and (MET 105 or FED 101). Restriction: Senior Standing. 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 troubleshooting.

MET 448. 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 303, MET 304, MET 314, ECET 329, (COM 312 or COM 313). Corequisite: MET 302. 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 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 460. Economics of Aging: Microeconomics(individual) and Macroeconomic(global) Challenges. 3 credits, 5 contact hours (2;2;1).
Corequisites: MIT 360. Restrictions: Senior Standing. Microeconomics is the science of how people make decisions at the small scale. Macroeconomics looks at how the economy works as a whole ("on aggregate") This course will investigate the challenges an aging individual face dealing with fixed incomes in an environment of exploding health and housing costs and the larger effects on population aging on the global economy. Economic and political stresses on governments necessitated by demographics where fewer workers are paying for a growing older population. The impacts of technology and longer life spans will necessitate professionals to create new and innovative solutions. Included are computer simulations focused on modelling these economic forces.

MNET 215. Materials and Processes for Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: MET 103, CHEM 301 or (CHEM 125 and CHEM 125A) or (CHEM 121 and CHEM 125A). The course introduces students to applications of materials, manufacturing processes, and metrology. Topics include engineering materials, heat treatment process, fabrication processes, finishing processes, and inspection processes.

MNET 300. Concepts In Machining. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 103. Restriction: Minimum of Junior Standing. 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 103. 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).
Prerequisites: MATH 138 or MATH 111. Introduction to statistics covering data collection, analysis and presentation. Specialized topics include probability, control charts, correlation, regression, hypothesis testing, and -experimentation.

MNET 405. Numc Control Machn Tools. 3 credits, 4 contact hours (2;2;0).
Prerequisites: ME 215 and MNET 303. 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 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: MET 237, 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 424. Facilities Planning. 2 credits, 3 contact hours (1;2;0).
Prerequisites: MNET 318. Operational principles and techniques of plant design. Topics are plant organization, plant location, layout, materials handling, production planning and control, inspection, methods and standards.

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

MNET 492. Special Projects. 2 credits, 3 contact hours (0;0;3).
See MNET 491.

MNET 493. Special Projects. 3 credits, 3 contact hours (0;0;3).
See MNET 491.

MNET 495. Cooperative Experien 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.

SDET 101. Fundamentals of Software and Data Technologies. 3 credits, 4 contact hours (2;2;0).
Restrictions: For Engineering Technology majors only; other majors require department approval to register. This Engineering Technology course will delve into the intricacies of modern software and data technologies, emphasizing their intertwined nature. Students will work with Python programming, understanding its pivotal role in data collection, analysis, and the underpinnings of AI. The course will explore the ethics of tech and AI, learn about the basics of machine learning, and gain insights into real-world applications of AI across various fields. No prerequisites are required to enroll. The lectures and hands-on labs are designed to complement each other, providing students with both theoretical knowledge and practical skills. This course is worth 3 credits and is positioned to be a stepping stone for students into the world of software, data, and AI.

SDET 102. Applications of Software Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SDET 101 or CS 106. This course covers practical application of software engineering tools and methodologies and emphasizes the hands-on application of Python, diving deep into software solutions tailored for various industries. Students will harness the power of deep learning for image recognition, tap into natural language processing for insights, and employ AI-driven strategies for robust decision-making. Building on the foundation set in the SDET 101 course, this curriculum will equip students with the skills to design, implement, and optimize software applications for real-world scenarios. Collaborative projects will mirror genuine industry problems, and rigorous evaluations will ensure students are job-ready. Only prerequisite is the completion of the SDET 101 course. Through a blend of lectures and application-driven labs, students will earn 3 credits and be well-prepared to spearhead software engineering initiatives in diverse sectors.

SDET 201. Data Engineering. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SDET 102. This course builds upon the fundamentals learned in SDET 102 by delving into the field of data engineering. Students will explore the full lifecycle of large-scale data handling, from modeling and management to real-time processing and warehousing. They will master the art and science of designing robust Extraction, Transformation, and Loading (ETL) pipelines, ensuring data quality and governance, and leveraging modern big data technologies. Through practical exercises and capstone projects, students will apply theoretical concepts to real-world challenges, implementing data solutions that adhere to the highest standards of security and privacy. They will also explore the use of cloud data services, gaining proficiency with major cloud platforms.

SDET 310. Computer Design Fundamentals for Software and Data Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Boolean algebra, gates, combinational and sequential logic. Memory, microprocessor, and I/O control IC's. Sequential bus architecture.

SDET 315. Computer Architecture for Software and Data Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Computer design fundamentals for Software and Data Engineering Technology, Von Neumann computer architecture: processor, memory and I/O. Processor organization: registers, ALU, and control. Memory organization and memory bus, I/O organization: I/O bus, memory mapped I/O. Number representations and ALU designs. Fundamentals of assembly language, lab exercises in assembly language are used throughout to illustrate concepts.

SDET 325. Medical Informatics Technology. 3 credits, 3 contact hours (3;0;0).
Restrictions: 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.

SDET 335. Networks Applications for Software and Data Engineering Technology I. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CS 100 or CS 106 or CS 113 or CS 115 or SDET 101. Covers common gateway interface (CGI), servers, network protocols, network administration, server and network per-formance.

SDET 341. Visual Basic.NET for Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CS 100 or CS 106 or CS 113 or CS 115 or SDET 101. Creation of windows with text, controls, menus and graphics, events detection, files and objects management, object oriented techniques.

SDET 345. Networks Applications for Software and Data Engineering Technology II. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SDET 335. Network security. Database implementations. Scaling.

SDET 373. Web App Development for Mobile. 3 credits, 4 contact hours (2;2;0).
Prerequisites: BME 210 or BNFO 135 or CS 100 OR CS 101 or CS 103 or CS 106 or CS 113 or CS 115 or SDET 101. 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.

SDET 395. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Restrictions: 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.

SDET 401. Senior Project. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SDET 335 and SDET 430. Restrictions: Senior standing in Software and Data Engineering 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.

SDET 420. 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.

SDET 425. Medical Informatics Technology II. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SDET 325. Advanced topics, builds on the core competencies introduced in Medical Informatics I. This course focuses on: Management of Information in Healthcare Organizations/Cost Benefit Analysis, Health and Financing, Consumer Health and Telehealth and Wireless Patient-Monitoring Systems. Cutting edge technologies that will impact on future healthcare delivery.

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

SDET 440. Visual Basic Applications for Engineering Technology. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SDET 341. PC-based control techniques, embedded systems. Database control. Real-time control. Network data acquisition. Man-machine interface and ergonomics considerations.

SDET 491. Special Projects in Software and Data Engineering Technology. 1 credit, 1 contact hour (1;0;0).
Restrictions: Senior standing in Software and Data Engineering Technology. The student works on selected projects guided by the department staff.

SDET 492. Special Projects in Software and Data Engineering Technology. 2 credits, 2 contact hours (2;0;0).
Restrictions: Senior standing in Software and Data Engineering Technology. The student works on selected projects guided by the department staff.

SDET 493. Special Projects in Software and Data Engineering Technology. 3 credits, 3 contact hours (3;0;0).
Restrictions: Senior standing in Software and Data Engineering Technology. The student works on selected projects guided by the department staff.

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.