

SAET - Eng. Edu. Division (SEED)

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 Bachelor of Science in Engineering Technology (BSET) degrees in nine different options, as well as Bachelor of Science (BS) degrees in General Engineering (GEN) and Concrete Industry Management (CIM). SAET also offers a Master of Science (MS) in Engineering Science.

The Engineering Education Division (SEED) consists of the Technology Education Program (TEED) and the General Engineering Program (GEN).

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

- Engineering Technology, Technology Education (TEED) - B.S. (<http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-seed/technology-education/>)
- General Engineering - B.S. (<http://catalog.njit.edu/undergraduate/newark-college-engineering/interdisciplinary-engineering-science/bs/>)
- Drones and Robotics (<http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-seed/drones-and-robotics-minor/>)
- Engineering Innovation Minor (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-seed/engineering_innovation-minor/)
- Safety Engineering (<http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-seed/safety-engineering-minor/>)

ENGR 101. Analytical Meth for Engr Appl. 4 credits, 6 contact hours (4.5;1.5;0).

Prerequisite: SAT Math score of 500 or above This course provides foundation in analytical methods that are used by engineers through an application-oriented, hands-on introduction to engineering analytical methods.

ENGR 210. Career Planning Seminar for En. 1 credit, 1.5 contact hour (1.5;0;0).

Prerequisite: Sophomore Standing. This course aims at providing engineering students with multidisciplinary and career planning skills in a seminar environment with emphasis on career planning, resume writing, and interview skills.

ENGR 211. Professional Skills for Engineers I. 1 credit, 1 contact hour (1;0;0).

Restrictions: Engineering and Engineering Technology students with Sophomore or higher standing. This course is designed to provide engineering students with the career planning and professional skills needed to search for and secure employment, and succeed in their career. This course will include a variety of self-directed online learning modules and in-person required activities that address: Career planning Career Development Services (CDS) resources & events Marketing and communicating your value and skills through Resume, Cover Letter & Professional Networking Platforms Interviewing Skills Professional Correspondence Transitioning from NJIT to the workplace.

ENGR 290. Pers of the Grand Challenges. 1 credit, 1 contact hour (1;0;0).

Prerequisite: Approval of the Instructor and the Grand Challenges Program Director; sophomore or higher standing. The first step for aspiring students in becoming a grand challenges scholar. Seven engaging colloquia will be offered every fall semester. Faculty conducting research in a Grand Challenge Theme will present the colloquia with one faculty member presenting at each colloquium. At the conclusion of each faculty presentation, and in the weeks in-between the presentations, students will engage in an activity organized to focus on exploring a potential engineering solution, addressing societal impacts, and holding debates on differing perspectives.

ENGR 301. Engineering Applications of Data Science. 3 credits, 4 contact hours (2;2;0).

Prerequisites: CS 100 or CS 101 or CS 106 or CS 113 or CS 115 or BME 210. Pre or Corequisites: MATH 225 or MATH 244 or MATH 279 or MATH 305 or MATH 333 or ECE 321 or IE 331 or MNET 315. Restriction: This course is intended for engineering majors. This is a course for junior level undergraduates in any engineering discipline focusing on the use of data science techniques to solve problems in engineering. We will first discuss the Python programming language and how it can be used to access, manipulate, explore, and visualize scientific datasets. We will discuss statistics and probability as it applies to engineering problems such as safety factors and probability of part failure; this includes conditional probability, probability distributions, hypothesis testing, and Bayesian inference. We will then discuss more advanced statistical models ("machine learning"), including linear and logistic regression, decision trees, and clustering. Possible applications of these methods will be demonstrated in such disciplines and topics as (but not limited to): chemical, mechanical and electrical engineering (optimization and controls), materials engineering (structure and property databases), biomedical engineering (medical diagnosis and medical imaging) and electrical and computer engineering (signal processing, target tracking, robotic navigation). Students will gain hands-on experience in implementing and utilizing these various methods through computational laboratory assignments and reports and a semester-long engineering design project.

ENGR 310. Co-op Work Experience I. 12 credits, 12 contact hours (0;0;12).

Prerequisites: ENGR 210; Completion of 36 credits; Cumulative GPA 2.5; Approval of department; Approval of CDS. Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Mandatory participation in seminars and completion of a report.

ENGR 311. Co-op Work Experience - Summer. 1 credit, 1 contact hour (0;0;1).

Prerequisites: ENGR 210; Completion of 36 credits; Cumulative GPA 2.5; Approval of department; Approval of CDS. Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Mandatory participation in seminars and completion of a report.

ENGR 312. Professional Skills for Engineers II. 1 credit, 1 contact hour (1;0;0).

Prerequisites: ENGR 211. This course is designed to provide engineering students with the career planning and professional skills needed to search for and secure employment, and succeed in their career. This course will include a variety of self-directed online learning modules and in-person required activities that address - career planning, workplace ethics, technical communication, engineering research, emotional intelligence, leadership and group dynamics.

ENGR 320. Prototyping Essentials. 3 credits, 4 contact hours (2;2;0).

Prerequisites: MATH 111 or MATH 113 or MATH 138 or (MATH 110 and ENGR 101) or (MATH 107 and ARCH 156). This course introduces students to the fundamental skills, equipment, safety procedures, and theory required to prototype and test basic mechanical and electrical systems as part of the engineering and product design process. Students learn basic prototyping skills starting with hand tools and moving to computer-controlled cutting, shaping, and measurement equipment such as 3D printers, water jets, lasers, CMM's, mills, and lathes. Students learn to use software to design components, develop and interpret prints, and program fabrication and inspection machinery. Entrepreneurial concepts, budget, and economic factors associated with prototyping are discussed and examined. Laboratory exercises require students to design, model, fabricate, and validate components and systems. The course concludes with a final project requiring students to design and produce a physical project in the NJIT Makerspace.

ENGR 330. Applications of Microcontrollers and IoT devices. 3 credits, 4 contact hours (2;2;0).

Microcontrollers are an integral part of many modern technological devices. This course will familiarize students to microcontrollers and its exciting applications in the fields of Internet of Things (IoT) and Robotics using a project-based hands-on approach. The microcontroller will be used as a component part of a broader design activity to introduce students to coding, logic, and automation in the wider context of product design. Students will work on multiple mini-projects to integrate a programmable system into a prototype such as a heart monitor, step counter, electronic scoreboard or a food temperature probe. Overall, this course will provide a basic understanding of software design and coding, microcontroller interfacing with sensors, actuators, motors etc., and robotics. Students will also develop modeling and prototyping skills and will be inspired towards making and service-learning.

ENGR 350. Intellectual Property for Engineers. 3 credits, 4 contact hours (2;2;0).

Prerequisites: FED 101 or MET 103. Restrictions: Minimum of Junior Standing. Intellectual Property drives the realization of designs and the development of engineering businesses. This course covers the fundamental of intellectual property inclusive of patents, copyrights, trade-secrets, and trademarks. Students will learn how to apply this background directly to design work, communication of ideas, and how they are integrated in business.

ENGR 360. Geometric Dimensioning and Tolerancing and Applied Metrology. 3 credits, 4 contact hours (2;2;0).

Prerequisites: FED 101 or MET 103. Restrictions: Junior Standing. Geometric Dimensioning and Tolerancing (GD&T) provides a powerful communication tool in the engineering development process, from concept to realization. Understanding applied metrology enables engineers to design for measurement and inspection. This course covers the fundamental principles of GD&T and measurement tools/analysis methods. Students will learn how to apply this background directly to engineering development. Career options and industry credentialing will be reviewed and discussed.

ENGR 400. Multidisciplinary Engineering Design Project. 3 credits, 3 contact hours (3;0;0).

Prerequisites: Junior or Senior standing and approval of instructor and NCE Associate Dean for Academic Affairs. Students design, document, and build a project or portion of a larger system as part of a multidisciplinary project under the supervision of a faculty member. Deliverables include written engineering design requirements, standards and specifications, bill of materials, detailed drawings suitable for fabrication, and a demonstration of a fabricated, assembled, tested, and functional project. Additional requirements may be added by the instructor with approval of the NCE Associate Dean for Academic Affairs.

ENGR 410. Co-op Work Experience II. 12 credits, 12 contact hours (0;0;12).

Prerequisites: ENGR 310; Completed at least 9 credits after ENGR 310; Cumulative GPA 2.5; Approval of department; Approval of CDS. Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Mandatory participation in seminars and completion of a report.

ENGR 423. Drone Science Fundamentals. 3 credits, 4 contact hours (3;1;0).

Restrictions: NCE students with senior standing and with instructor permission. This course will cover the fundamentals of quadrotor drone kinematics and dynamics, quadrotor sensor data analysis, linear and non-linear flight control, and motion planning for a single quadrotor. Students will be guided through the process of building a quadrotor drone, setting up the required flight control parameters and associated Hardware-In-The-Loop simulators, and using Python/C programming for basic single quadrotor motion planning algorithms. Students will also be guided through the preparation for the Federal Aviation Authority (FAA) Part 107 Certified Drone Pilot knowledge test.

ENGR 424. Robotics Science Fundamentals. 3 credits, 4 contact hours (3;1;0).

Prerequisites: BME 210 or CS 101 or CS 106 or CS 113 or CS 115. This hands-on course will cover experiments that elucidate the fundamentals of ground robots and robotic manipulators, sensor data analysis, linear and non-linear motion control, and motion planning for a ground robots and robotic manipulators. Student will be guided through the process of building such robots, setting up the required motion control parameters and associated Hardware-In-The-Loop simulators, and programming of sensor-based single and multi-robot motion planning algorithms.

ENGR 430. Engineering for Quality and Reliability. 3 credits, 4 contact hours (2;2;0).

Prerequisites: FED 101 or MET 103. Restrictions: Senior Standing. Engineering for quality and reliability has become paramount to ensure realized products and processes are not only effective but safe. This course covers the fundamental principles and tools of quality and reliability engineering. Students will learn how to apply this background directly to engineering work in industry, government, and academic settings. Career options and industry credentialing will be reviewed and discussed.

ENGR 491. Research and Independent Study I. 3 credits, 3 contact hours (3;0;0).

Prerequisites: Approval of the Instructor (Faculty Mentor) and the Grand Challenges Program Director Junior or higher standing. Restrictions: Junior or higher standing. Provides the student with an opportunity to work on a research project under the individual guidance of a faculty mentor associated with the Grand Challenges Scholars Program. A written report, or a research paper, or a final presentation is required for course completion.

ENGR 492. Research and Independent Study II. 3 credits, 3 contact hours (3;0;0).

Prerequisites: ENGR 491. Restrictions: Junior or higher standing, and Approval of the Instructor (Faculty Mentor) and the Grand Challenges Program Director. Provides the student with an opportunity to continue to work on a research project under the individual guidance of a faculty mentor associated with the Grand Challenges Scholars Program. Students may continue the work they started in ENGR 491 or can work on a different grand challenge with the same or different faculty mentor. A written report, or a research paper or a final presentation is required for course completion.

ENGR 493. Service Learning Experience for Engineers. 3 credits, 3 contact hours (3;0;0).

Prerequisites: ENGR 290. Restrictions: Junior or higher standing, and Approval of the Grand Challenges Program Director. Through service experiential learning, students will engage in acquiring a multi-cultural competency. A host of opportunities are available for fulfilling this competency: an experience will require prior approval of the GCSP Faculty Advisor and the Program Director. Students will be required to develop a plan in carrying out the experience. Potential opportunities include but are not limited to 1. An Engineers without Borders project, 2. An EPICS project, 3. A global internship or cooperative education experience that is voluntary (unpaid), and 4. A study abroad experience.

ESC 310. Work Experience I. 3 credits, 3 contact hours (0;0;3).

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.

GEN 301. Applications of Microcontrollers and IoT devices. 3 credits, 4 contact hours (2;2;0).

Prerequisites: FED 101, CS 101 or CS 106 or CS 115 or BME 210. Microcontrollers are an integral part of many modern technological devices. This course will familiarize students to microcontrollers and its exciting applications in the fields of Internet of Things (IoT) and Robotics using a project-based hands-on approach. The microcontroller will be used as a component part of a broader design activity to introduce students to coding, logic, and automation in the wider context of product design. Students will work on multiple mini-projects to integrate a programmable system into a prototype such as a heart monitor, step counter, electronic scoreboard or a food temperature probe. Overall, this course will provide a basic understanding of software design and coding, microcontroller interfacing with sensors, actuators, motors etc., and robotics. Students will also develop modeling and prototyping skills and will be inspired towards making and service-learning.

GEN 491. Research Independent Study I. 3 credits, 3 contact hours (3;0;0).

Restriction: senior standing in general engineering. Provides the student with an opportunity to work on a research project under the individual guidance of a program faculty member.

GEN 492. Research Independent Study II. 3 credits, 3 contact hours (3;0;0).

Prerequisite: GEN 491. A continuation of GEN 491.