SAET - Built Env. Division (SBED)

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 Built Environment Division (SBED) consists of the Construction Engineering Technology (CET), Concrete Industry Management (CIM), and Surveying Engineering Technology (SET) programs. In addition, SBED administers the BS in Engineering Technology, Concentration in Construction Management Technology (CMT) program found in the Engineering Education Division (SEED).

The programs in Construction Engineering Technology (CET) and Surveying Engineering Technology (SET) are accredited by The Engineering Technology Accreditation Commission, ETAC of ABET, http://www.abet.org (http://www.abet.org/) under the General Criteria and 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

- Construction Engineering Technology - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-sbed/construction-engineering-technology/)
- Concrete Industry Management - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-sbed/concrete-industry-management-technology/)
- Surveying Engineering Technology - B.S. (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-sbed/surveying-engineering-technology/)
- Advanced Building Systems Minor **(**http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-sbed/advanced-building-systems-minor/**)**
- Remote Sensing Minor (http://catalog.njit.edu/undergraduate/newark-college-engineering/saet-sbed/remote_sensing_minor/)

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. Principles of Heavy Highway Construction. 3 credits, 4 contact hours (2;2;0).
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. Principles of Building Construction. 3 credits, 4 contact hours (2;2;0).
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, 4 contact hours (2;2;0).
Prerequisites: MET 105. 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 331. Structural Systems. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CET 233 and MATH 238. 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 340. Land Development. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CET 313 and (SET 200 and SET 200A) or (CE 200 and CE 200A). 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 development projects from initial contact through the proposal phase to preliminary and final design.

CET 341. Soils and Earthwork. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 237. Problems are investigated relating to soil mechanics, soil supported foundations for engineering structures. Appropriate field trips are made.

CET 350. Safety and Health Regulations for Construction. 2 credits, 3 contact hours (2;0;1).
Restrictions: Junior or Senior standing or department approval. This course allows students to complete Occupational Safety and Health Administration (OSHA) modules described for Safety and Health Regulations for Construction. Satisfactory completion of this course leads to the OSHA 30 CFR 1926 certification.

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, 4 contact hours (2;2;0).
Prerequisites: (CET 313 AND CET 314) OR SET 440. 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 enginerring technology or contruction 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 document tracking.

CET 416. Senior Construction Project. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CET 415. Restrictions: 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 constructability analysis, value engineering, productivity improvement, quality control, advanced field and office administration techniques, problem solving, and construction auto-mation. Extensive use of construction-related computer software. Written submittals and oral presentations 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 423. Construction Safety. 3 credits, 4 contact hours (2;2;0).
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 431. Construction Testing. 3 credits, 4 contact hours (2;2;0).
Prerequisite: MET 237. 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, 4 contact hours (2;2;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).
Restrictions: 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.

CIM 101. Introduction to the Concrete Industry. 3 credits, 4 contact hours (2;2;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.

CIM 205. Concrete Properties & 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.

CIM 210. Concrete Applications. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CIM 101. 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.

CIM 215. Concrete Repair. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CIM 101. This course covers concrete repair topics and focuses on codes, specifications, industry standards, and unique cases in the concrete industry.

CIM 310. Concrete Products and Delivery. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CIM 210. 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.

CIM 315. Concrete Construction Methods. 3 credits, 4 contact hours (2;2;0).
Prerequisites: CIM 210. This course focuses on Fundamentals of Concrete, an introduction to construction forms and reinforced Steel, batching, mixing, transporting, and handling of concrete, placing, finishing, and curing of concrete, and finishing tools & Techniques. The course also includes concrete joints, concrete pumping, hot and cold Weather Concrete. This course also includes cost estimates and project scheduling.

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

CIM 410. Senior Project in CIM. 3 credits, 4 contact hours (2;2;0).
Restrictions: 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.

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

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

CIM 493. Independent Study. 3 credits, 3 contact hours (0;0;3).
Three-credit independent study course for CIM students. Must have an instructor agreeing to sponsor the independent study. Approval by program coordinator is required.

CIM 497. 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. 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.

CIM 498. Coop Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: CIM 497. Restrictions: 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.

CMT 332. Structural Systems for Construction Management. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 138. 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 Aspects of Construction. 3 credits, 4 contact hours (2;2;0).
Restrictions: Junior or Senior Standing. An introduction to construction-related environmental topics and their measurement. The course will cover environmental quality topics including chemistry, indoor air quality, lead/asbestos abatement, radon remediation, noise, and vibration. Applied laboratories will reinforce lecture topics.

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, 4 contact hours (2;2;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.

SET 200. Introduction To Geomatics. 2 credits, 2 contact hours (2;0;0).
Plane surveying with angle and distance measurements; leveling; topographic mapping; traverse and area computations; 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 207. Evidence and Procedures for Property Surveys. 3 credits, 3 contact hours (3;0;0).
Co-rerequisites: 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 301. Route Surveying. 3 credits, 4 contact hours (2;2;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 304. Adjustment Computations I. 3 credits, 3 contact hours (3;0;0).
Prerequisites: MATH 111 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 395. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Restrictions: Junior standing, Approval of the department and permission of NJIT Career Development Services (CDS). 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, completion of a report and presentation.

SET 400. Digital Surveying Methods. 3 credits, 4 contact hours (2;2;0).
Prerequisites: SET 200 and SET 200A. 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: ENGR 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 460. GIS Data Integration and Decision Support. 3 credits, 3 contact hours (3;0;0).
Prerequisites: SET 200 or Department permission. This is the 3rd course of a 3-part sequence of a basic training program for a GIS analyst. GIS for decision support involves processes of analyzing and identifying patterns in geographic data and describing relationships between spatial features. This course introduces a number of techniques on analysis of spatial data and data integration through a combination of lectures and hands-on experiential learning. Students will work on a term project by applying GIS tools and geospatial analytical techniques to build a decision support system for a solution to a problem in their career field.

SET 490. Senior Project in Surveying. 3 credits, 4 contact hours (2;2;0).
Restrictions: 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.