Construction Management Engineering Technology

Prof. Orla Smyth-LoPiccolo, Chair
Architecture & Construction Management Department
Orla.LoPiccolo@farmingdale.edu
631-420-2024
School of Engineering Technology
Bachelor of Science Degree

The Construction Engineering Management Technology program has been designed to respond to the need for skilled professionals possessing the level of sophistication necessary to accommodate state-of-the-art technology which has impacted the construction industry. It will incorporate extensive use of the computer in the technical specialty together with upper level mathematics, economics, and communications.

The Construction Engineering Management Technology program encompasses study in traditional engineering technology offerings (Statics, Strength of Materials, Structural design Materials testing, etc.). The program is complemented with offerings in project control, scheduling, cost control quality control, construction productivity, and economics. It prepares students for employment in an emerging occupation within the construction industry. Graduates will possess expertise in construction and specialized administrative skills commensurate with the requirements dictated by the industry to coordinate and execute the construction of the design created by the engineer and the architect.

This program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org.

Construction Management Engineering Technology (BS) Program Outcomes:

• Graduates will have broad background in one or more areas of infrastructure and building construction, estimating, cost control, project management and technology. Graduates will assume leadership positions in the construction industry.
• Graduates will be creative problem solvers in industry.
• Graduates will be effective communicators in professional setting.
• Graduates will adapt state of the art technologies and processes in industry.
• Graduates will pursue continuing education and professional development opportunities.

Potential Employment Opportunities

Project Manager
Assistant Project Manager
Construction Manager
Project Super

Student Club – Architecture and Construction Technology (ACT) Club

Student Learning Outcomes: Construction Management Engineering Technology

A. An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
B. An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

C. An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

D. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;

E. An ability to function effectively as a member or leader on a technical team;

F. An ability to identify, analyze, and solve broadly-defined engineering technology problems;

G. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

H. An understanding of the need for and an ability to engage in self-directed continuing professional development;

I. An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;

J. A knowledge of the impact of engineering technology solutions in a social and global context; and

K. A commitment to quality, timeliness, and continuous improvement.

Fall 2018- Subject to Revision

<table>
<thead>
<tr>
<th>Liberal Arts and Sciences</th>
<th>(61 credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGL 101 Composition I: College Writing (GE)</td>
<td>3</td>
</tr>
<tr>
<td>EGL 102 Composition II: Writing About Literature</td>
<td>3</td>
</tr>
<tr>
<td>EGL 310 Technical Writing (GE)</td>
<td>3</td>
</tr>
<tr>
<td>MTH 129 Pre-Calculus with Applications (GE)</td>
<td>4</td>
</tr>
<tr>
<td>MTH 130 Calculus with Applications (GE)</td>
<td>4</td>
</tr>
<tr>
<td>MTH 236 Calculus II with Applications</td>
<td>3</td>
</tr>
<tr>
<td>MTH 390 Methods in Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>PHY 135 Physics I (GE)</td>
<td>4</td>
</tr>
<tr>
<td>PHY 136 Physics II</td>
<td>4</td>
</tr>
<tr>
<td>Science/MTH Technical Elective*</td>
<td>3</td>
</tr>
<tr>
<td>ECO 156 Principles of Economics (Macro) (GE)</td>
<td>3</td>
</tr>
<tr>
<td>ECO 157 Principles of Economics (Micro)</td>
<td>3</td>
</tr>
<tr>
<td>ECO 321 Engineering Economics</td>
<td>3</td>
</tr>
</tbody>
</table>
The Arts (GE) 3
Humanities (GE) 3
American/Other World/Western Civilization History (GE) 3
Foreign Language (GE) 3
Mathematics Elective 3
Liberal Arts & Sciences electives 3

Please refer to the General Education and Writing Intensive Requirement Sections of the College catalog and consult with your advisor to ensure that graduation requirements are satisfied.

*In consultation with department advisor.

Required: Construction Management (65 credits)
CON 103 Surveying 3
CON 106 Statics 3
ARC 131 Introduction to Graphics 4
BUS 109 Management Theory and Practices 3
CON 161 Materials & Methods of Construction I 3
CON 162 Materials & Methods of Construction II 3
CON 207 Elements of Strength of Materials 3
ARC 263 Mechanical, Electrical, Plumbing & Energy Systems in Buildings 3
CON 302 Soils, Foundations & Earth Structures 3
CON 303 Hydraulics 3
ARC 310 Construction Design 4
CON 350 Introduction to Construction Engineering 3
CON 355 Construction Management Financial and Accounting Principles 3
CON 357 Quantity Surveying and Costing 3
ARC 364 Site Design and Construction 3
CON 401W Construction Project Mgmt & Scheduling 3
CON 402 Civil Engineering Materials 3
CON 406 Advanced Project Planning and Scheduling 3
CON 409 Structural Design 3
Technical Elective* 3
CON 496 Capstone Project 3
Total Credits: 126

Degree Type: BS
Total Required Credits: 126

*CON 361, IND 308 or CON 299 preferred. See advisor for additional technical electives.

Course Descriptions

**EGL 101 Composition I: College Writing (GE)**
This is the first part of a required sequence in college essay writing. Students learn to view writing as a process that involves generating ideas, formulating and developing a thesis, structuring paragraphs and essays, as well as revising and editing drafts. The focus is on the development of critical and analytical thinking. Students also learn the correct and ethical use of print and electronic sources. At least one research paper is required. A grade of C or higher is a graduation requirement. Note: Students passing a departmental diagnostic exam given on the first day of class will remain in EGL 101; all others will be placed in EGL 097. Prerequisite is any of the following: successful completion of EGL 097; an SAT essay score (taken prior to March 1, 2016) of 7 or higher; an SAT essay score (taken after March 1, 2016) of 5 or higher; on-campus placement testing. Credits: 3

**EGL 102 Composition II: Writing About Literature**
This is the second part of the required introductory English composition sequence. This course builds on writing skills developed in EGL 101, specifically the ability to write analytical and persuasive essays and to use research materials correctly and effectively. Students read selections from different literary genres (poetry, drama, and narrative fiction). Selections from the literature provide the basis for analytical and critical essays that explore the ways writers use works of the imagination to explore human experience. Grade of C or higher is a graduation requirement. Prerequisite(s): EGL 101 Credits: 3

**EGL 310 Technical Writing (GE)**
A detailed study of the fundamentals of writing technical reports and other technical communications. Topics emphasized include the elements of a technical report, the interpretation of statistics and data, and the composition of letters, memos, and informal reports containing technical information. Assignments and student exercises are drawn from the student's technical area. Prerequisite(s): EGL 102 with a grade of C or higher Credits: 3

**MTH 129 Pre-Calculus with Applications (GE)**
In this course, the topics introduced in College Algebra course will be extended. The course will provide a comprehensive study of functions, which are the basis of calculus and other higher-level mathematics courses. The students will study the properties, graphs, and some applications of polynomial, rational, inverse, exponential, logarithmic, and trigonometric functions. Note: Students completing this course may not receive credit for MTH 117. Prerequisite(s): MP3 or MTH 116 Credits: 4

**MTH 130 Calculus with Applications (GE)**
This is a calculus course for those not majoring in Mathematics, Engineering Science or Computer Science. Topics include the derivative, differentiation of algebraic, trigonometric, exponential and logarithmic functions, applications of the derivative and the definite integral. Applications are taken from technology, science, and business. Problem solving is stressed. A graphing calculator is required. Note: Students completing this course will not receive credit for MTH 150. Prerequisite(s): MP4 or MTH 117 or 129 Credits: 4
MTH 236 Calculus II with Applications
A continuation of Calculus I with Applications. Topics include techniques of integration, applications of the definite integral, multivariable calculus, and an introduction to Differential Equations. Applications are taken from technology, science and business. Problem solving is emphasized. A graphing calculator is required. Prerequisite(s): MTH 130 or MTH 150 Credits: 3

MTH 390 Methods in Operations Research
This course is intended to focus on understanding, formulating and solving deterministic models in operations research. Maximum and Minimum Linear Programming problems will be studied graphically and theoretically. The Simplex Method, Sensitivity Analysis and Duality will be covered and an in-depth analysis of the reasoning on which these topics are based will be given. Instruction in computer software techniques will be presented to solve Linear Programming problems, using the simplex method and sensitivity analysis. Transportation Problems, Integer Programming, or Markov Chains will be covered. In order to enhance quantitative reasoning, the course emphasizes the formulation of mathematical models commonly used by operation research analysts, as well as the theoretical and computer software solutions to these models. Prerequisite(s): MTH 130 or MTH 150 Credits: 3

PHY 135 Physics I (GE)
An integrated theory/laboratory general college physics course without calculus. Topics will include fundamental concepts of units, vectors, equilibrium, velocity and acceleration in linear and rotational motion, force, energy, momentum, fluids at rest and in motion, and oscillatory motion. Laboratory problems, experiments and report writing associated with the topics studied in the theory are performed. Prerequisite(s): MTH 129 Corequisite(s): PHY 135L Credits: 4

PHY 136 Physics II
A continuation of PHY 135. Topics will include heat, electricity, magnetism, light and optics. Prerequisite(s): PHY 135 Corequisite(s): PHY 136L Credits: 4

ECO 156 Principles of Economics (Macro) (GE)
This course is designed to introduce classic macroeconomic issues such as unemployment, inflation, national income and economic growth. The course will provide a unified framework to address these issues and to study the impact of different policies, such as monetary and fiscal policies, on the aggregate behavior of the economy. Analytical tools will be used to understand the experiences of the United States and other countries, and to address how current policy initiatives affect their macroeconomic performance. Credits: 3

ECO 157 Principles of Economics (Micro)
This course introduces students to fundamental economic concepts and theory, including demand, supply, and the formation of equilibrium prices in product and resource markets. Students will learn a specific set of analytical tools as well as how to apply them to current policy issues. In addition, the course offers an introduction to applied fields such as industrial organization (market structures), labor economics, international trade, and market failure. Credits: 3

ECO 321 Engineering Economics
This course will provide students with a basic understanding of the economic aspects of engineering in terms of the evaluation of engineering proposals with respect to their worth and cost. Topics include: introduction to Engineering Economics; interest and interest formulas; equivalence and equivalence calculations; evaluation of replacement alternatives and operational activities; basic fundamentals of cost accounting. Prerequisite(s): Admission to a Tech Program or approval of this Department chair. Credits: 3

CON 103 Surveying
The development of skills in the use of the basic surveying instruments- tape, level, transit. Trigonometric and differential leveling and cross-sectioning. Azimuth, bearing and angle determination by repetition procedures. Angular closures. Stadia
and stadia reduction of inclined sights, topographic mapping by transit stadia and plan table methods. This course will include a field laboratory assignment. Credits: 3

**CON 106 Statics**
This is a basic course in Statics. The main objective of this course is to provide the student with a basic understanding of the principles of statics. Topics such as resultant of a force, equilibrium of forces, moments, couples, analysis of simple trusses, centroids, center of gravity, moments of inertia and friction are covered in this course. Prerequisite(s): MTH 129 Credits: 3

**ARC 131 Introduction to Graphics**
Introduction to architectural and construction graphics using hand drawing/drafting and Computer Aided Drafting (CAD). Hand drawing/drafting topics include: lettering, technical sketching, use of drafting instruments, the fundamentals of orthographic projection, plan, section, elevation development and pictorial drawings to develop the student’s abilities to visualize and describe objects graphically. CAD topics include software commands and drawing strategies for 2-D and 3-D CAD work, plans, sections, elevations, and details, information management, assembly of drawings and scales. Note: This course includes a required laboratory designed to provide extra time for the studio experience. Credits: 4

**BUS 109 Management Theory and Practices**
This introductory course covers management principles pertaining to human resources, individual behavior in organizations, employee motivation and performance, and business ethics. Topics also include managing and the manager’s job; planning and decision making; employee performance appraisal and feedback; leadership and influence processes; interpersonal relations and communication; and managing work groups and teams. Credits: 3

**CON 161 Materials & Methods of Construction I**
An introduction to the engineering properties and the uses of construction materials including soils, concrete, masonry, steel and wood. Classroom testing demonstrations of several materials are included. Conventional construction systems are studied. The student is also given an orientation to the construction industry, the associated professions, and the varieties of employment available. Note: Students cannot get credit for CON 161 and 161W; CON 161W can be used to fulfill the writing intensive requirement which is offered at the discretion of the Architectural/Construction Management Department Credits: 3

**CON 162 Materials & Methods of Construction II**
A continuation of CON 161 extended to include the study of architectural properties of selected materials, methods of construction, and building components. Class work includes technical problem solving using quantitative and graphic analysis of specific building construction systems. Prerequisite(s): CON 161 Credits: 3

**CON 207 Elements of Strength of Materials**
Introduces to the concepts of stress, strain, bending and shear stresses, including elasticity, shear and moment diagrams for beams, moment of inertia of unsymmetrical sections, thermal and combined stresses. Laboratory demonstration of experiments and testing equipment are included. Prerequisite(s): CON 106 or MET 201 Credits: 3

**ARC 263 Mechanical, Electrical, Plumbing & Energy Systems in Buildings**
An overview of mechanical, electrical and plumbing (MEP) aspects of buildings. Intended to develop students’ ability to analyze energy requirements of buildings and various methods of energy conservation and thermal efficiency. Topics covered include heat flow, system and equipment for heating and cooling. Also included are water supply and wastewater treatments for buildings. Prerequisite(s): CON 162 Credits: 3

**CON 302 Soils, Foundations & Earth Structures**
This course introduces soil mechanics, foundation and earth structure to the engineering technology students. It includes soil classification, soil properties, soil stresses, earth pressures, bearing capacity, slope stability. It also discusses principles of
foundation analysis and design, retaining walls, etc. Laboratory experiments to test behavior of soils included. Prerequisite(s): CON 207 Corequisite(s): CON 302L Credits: 3

CON 303 Hydraulics
This course provides a broad understanding of the basic principles of engineering hydraulics and hydrology. The emphasis is on application of the theories. It involves basic principle of hydraulics, flow in closed conduits, flow in open channels, hydraulic structures, principles of hydrology, groundwater hydraulics, and related laboratory experiments. Computer application included. Prerequisite(s): CON 207 and PHY 136 Corequisite(s): CON 303L Credits: 3

ARC 310 Construction Design
Construction Design is a technology-based design studio emphasizing a methodological approach to the assembly of the building’s envelope, materials and systems. The integration of building code requirements, life safety, sustainability, accessibility, building energy systems, structure, construction and materials are central to effectively achieving design intent. Knowledge from Materials and Method of Construction I and II, Energy in Buildings and Graphics are applied to specific drawing assignments. A residential Type V construction, and a commercial Type II or Type III construction, building project will be advanced resulting in a set of construction documents. Note: This course includes a required laboratory designed to provide extra time for the studio experience. Prerequisite(s): ARC 131, CON 106, and ARC 263 Credits: 4

CON 350 Introduction to Construction Engineering
This course introduces construction engineering principles and methods and equipment used in heavy and commercial construction. It includes earthmoving excavating, loading and hauling, rock excavation, compressed air and water systems, tunneling, and some selected topics from building construction. Prerequisite(s): CON 162 and CON 207 Credits: 3

CON 355 Construction Management Financial and Accounting Principles
This course covers basic construction financing and cost accounting systems, job costing approaches, project budgeting, financial reporting procedures, forecasting financial needs, time value of money, evaluating investments, construction loans and credit, the impact of taxes and life cycle analysis. Computers applied as required. Prerequisite(s): BUS 109 and Junior level status Credits: 3

CON 357 Quantity Surveying and Costing
This course focuses on fundamentals of quantity survey and costing of residential and commercial facilities. Quantification of materials from construction drawings is covered in this course. Topics also covered range from site work, forms, concrete, metals and masonry, plumbing and electrical to wood framing and steel framing. The course also introduces fundamentals of computer assisted estimating. Prerequisite(s): CON 162 Credits: 3

ARC 364 Site Design and Construction
This is an advanced course in the utilization of engineering and architectural principles from concept through the construction techniques of traditional and sustainable site development. Site planning techniques, municipal land development requirements, zoning regulations, soil stabilization techniques, erosion control parameters, stormwater management practices, and site construction details are applied to a site design project. Computer-aided programs in site design and survey data management will be introduced. Prerequisite(s): CON 162 and (ARC 131 or CON 121) Credits: 3

CON 401W Construction Project Mgmt & Scheduling
This course gives an in-depth introduction and orientation to construction project management. This includes professional construction management in practice and methods in professional construction management. Some of the areas this course will cover are: Bidding and Award, Application of Controls, Scheduling, Planning and Control of Operations and Resources, Procurement Quality Assurance, Safety and Health in Construction, Industrial Relations. Computer Applications included. This is a writing-intensive course. Note: Students cannot get credit for CON 401 and 401W; CON 401W can be used to fulfill
the writing intensive requirement. Note: Offered at the discretion of the Construction/Architectural Management Department
Prerequisite(s): CON 162 and EGL 101 with a grade of C or higher Credits: 3

**CON 402 Civil Engineering Materials**
This course covers a study of the materials used for Civil Engineering construction purposes. The materials to be studied are concrete, steel, asphalt and wood. The physical parameters which contribute to material performance are studied. Appropriate laboratory tests are included. Documents from the American Concrete Institute and the American Society of Testing material will be used. Prerequisite(s): CON 162 Corequisite(s): 402L Credits: 3

**CON 406 Advanced Project Planning and Scheduling**
CON 406 Advanced Project Planning and Scheduling. Topics include introduction to advanced project planning concepts and terminology, development of schedule activities and preparing and maintaining computerized schedules. Introduction to Building Information Modeling (BIM). Prerequisite(s): CON 401W Credits: 3

**CON 409 Structural Design**
This course introduces fundamentals of structural steel design with basic frame analysis. This includes design of tension members, compression members, beams, columns, and various connections. This course also teaches the basic principles of wood design, which includes formwork design and frame construction. Computer application is included. Prerequisite(s): CON 207 Credits: 3

**CON 496 Capstone Project**
This is a capstone course. It utilizes skills and knowledge acquired in various courses in the curriculum and general education courses to produce a real life project. In this course, students follow a faculty driven structured process to integrate various components of a project. This course introduces very little new material, rather it helps the student to synthesize skills and knowledge learned in other courses to apply in real-life situations. Prerequisite(s): Department Approval, Upper Division Status and substantial completion of the program. Credits: 3

Admission to Farmingdale State College - State University of New York is based on the qualifications of the applicant without regard to age, sex, marital or military status, race, color, creed, religion, national origin, disability or sexual orientation.