SYRACUSE UNIVERSITY

Department of Civil and Environmental Engineering (CIE)

Mission/Goal Statements, Educational Objectives and Program Outcomes

The mission of the CIE Department is to promote learning and the creation, dissemination, and application of knowledge in Civil and Environmental Engineering through integration of teaching, scholarship, and service.

The goal of the CIE Department is to prepare students for engineering practice, advanced study, and life-long learning in Civil and Environmental Engineering. Our graduates are expected to be proficient in the fundamentals of engineering analysis and design, and to understand the importance and methods of effective communication. Our students are encouraged to use the extensive educational resources of Syracuse University and the Syracuse University community to broaden and enhance the quality of their university education.

Our education objectives can be summarized in the following curricular areas:

**Engineering Fundamentals:** Engineering fundamentals, taught in a series of courses in the first three years, give students a solid understanding and appreciation of the fundamentals of civil and environmental engineering. Courses include ECS 101, ECS 104, ECS 221, ECS 222/ELE 231/MAE 251/CHE 346, CIE272, ECS 325, ECS 326, MAE 341, CIE331, CIE 337, and CIE 341.

**Technical Knowledge:** Students are required to augment their basic engineering skills and enhance their technical knowledge in selected disciplines by taking additional required courses and technical/professional electives. Courses may include CIE 332, CIE 338, CIE 342, CIE 441, CIE 471, CIE 472, CIE 352, and selected technical and professional electives.

**Ethics:** Engineering ethics are discussed throughout the curriculum. A unit of engineering ethics is an important part of the freshman Introduction to engineering (ECS101) and senior Capstone Design (CIE 475) courses and addresses moral and ethical issues in engineering practice. Practicing engineers from the Syracuse area assist the faculty in presenting this material.

**Math and Science Education:** As part of the degree requirements, all students are required to complete a series of math courses from calculus to differential equations, as well as courses in basic sciences such as chemistry and physics.
**Computer Skills:** The use of a computer as a tool to collect, analyze, compute, interpret, and present data is encouraged starting in the freshman year and continuing through the senior year. Several computer laboratories are located in the engineering buildings to provide the necessary state-of-the-art hardware and software for student use.

**Soft Skills:** A liberal arts core of social sciences (SS) and humanities (HUM) courses is required of every student. These courses are selected by the students in consultation with their advisors with the aim toward enhancing their understanding of the human aspect of engineering and the societal impact of their actions and decisions. Both oral and written communication skills are emphasized in the curriculum. Students acquire written communication skills in three writing classes: WRT 105, WRT 205, WRT 307, and in courses where laboratory or written reports are required. Oral communication skills are emphasized in several engineering design courses, e.g., ECS 101, CIE 475, and others in which students are required to present their work to an audience of peers, faculty, and practicing engineers.

**Hands-on and Design Experiences:** Hands-on laboratory experience is gained in a number of courses such as CHE 107, CHE 117, PHY 221, PHY 222, CIE 272, CIE 332, CIE 337, CIE 342, CIE 352, CIE 471, and CIE 472. Design experience is acquired though course assignments and projects associated with various design courses available throughout the curricula. The knowledge and experience gained in these courses is used in the Capstone Design course, CIE 475, where students in their final semester solve a comprehensive, open-ended design problem and present their results before a panel of peers, faculty, and practitioners from the local engineering community.

**Teamwork:** Students work in groups in design and laboratory projects, learning that cooperation with and respect for their peers is a vital component for success in the engineering profession.

**Minors:** To broaden and enhance their educational experience, all students are encouraged to include a minor in their program of study. In most cases, the courses in the minor can be scheduled so that the program of study can be completed in four years.
Our **program outcomes** are in-line with those identified by the Accreditation Board for Engineering and Technology (ABET 2000 a-k), i.e., at the time of their graduation, our students should acquire:

(a) An ability to apply knowledge of math, science, and engineering.
(b) An ability to design and conduct experiments, as well as to analyze and interpret data.
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints.
(d) An ability to function on multidisciplinary teams.
(e) An ability to identify, formulate, and solve engineering problems.
(f) An understanding of professional and ethical responsibility.
(g) An ability to communicate effectively.
(h) An understanding of the impact of engineering solutions in a global, economical, environmental, and societal context.
(i) A recognition of the need for, and an ability to engage in life-long learning.
(j) A knowledge of contemporary issues.
(k) An ability to use techniques, skills, and modern engineering tools necessary for engineering practice.