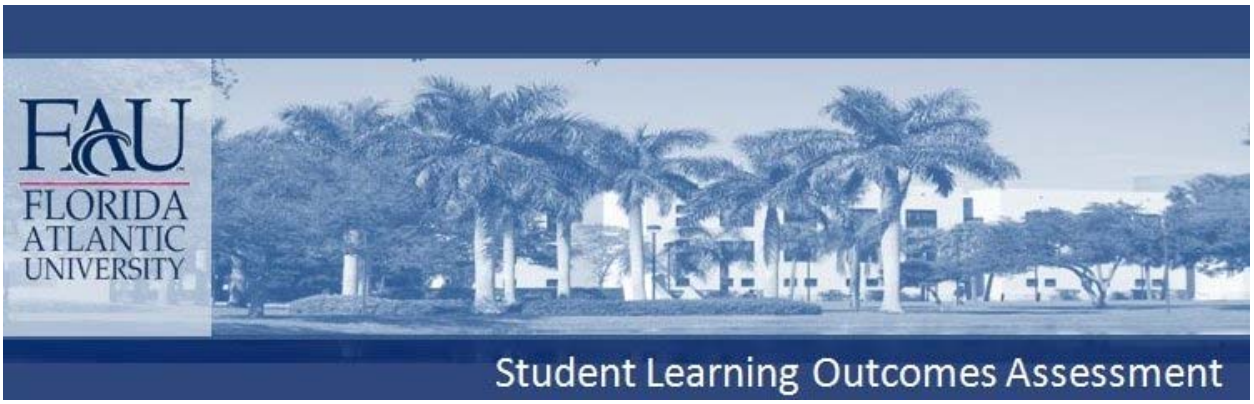

Bachelors of Science Environmental Engineering

For graduation, students must obtain a grade of "C" or better in all required courses including general education requirements, basic mathematics and sciences, engineering fundamentals and professional core courses. Students must obtain a 2.0 GPA in all Environmental Engineering courses attempted.

The Department maintains a flowchart listing all required program coursework. This flowchart and a program plan are reviewed with each student on a regular basis by undergraduate advising. The students are required to meet with their advisor each semester before registration for classes. Failure to maintain satisfactory progress in the program will initiate a review process by the Department.

Environmental engineering faculty and industry members of the Department/Program Advisory Council evaluate students on content knowledge, communication skills, and critical thinking skills. Possible outcomes for a student who receives an unsatisfactory evaluation include repeating course, tutoring or additional coursework.

CONTENT KNOWLEDGE (Discipline-Specific Declarative Knowledge and Technical Skills): An ability to apply their knowledge of engineering fundamentals, experimental methodologies and modern engineering tools to identify and formulate engineering solutions.

Students will have a working knowledge of math, science and engineering fundamentals and the ability to plan and execute an engineering design to meet an identified need in environmental engineering curricular content areas:

a) formulate material and energy balances
b) analyze the fate and transport of substances in and between air, water, and soil phases
c) conduct laboratory experiments and analyze and interpret the resulting data in more than one major environmental engineering focus area, (e.g., air, water, land, environmental health)
d) design environmental engineering systems that include considerations of risk, uncertainty, sustainability, life-cycle principles, and environmental impacts; and apply advanced principles and practice relevant to the program objectives
e) understand concepts of professional practice, project management, and the roles and responsibilities of public institutions and private organizations pertaining to environmental policy and regulations

Specifically with respect to the following engineering core courses:

- CWR3201C Applied Hydraulics (a,c)

- CWR4202 Hydrologic Engineering (d,e)
- ENV3001C Environmental Science and Engineering (a,b,c,d,e)
- ENV4356 Solid and Hazardous Waste and Site Remediation (a,b,d,e)
- ENV4514 Water and Wastewater Treatment Systems (a,b,d,e)
- ENV4612 Introduction to Pollution Prevention and Sustainability (a,b,d,e)
- ENV4115C Air Pollution and Control Systems with Lab (a,b,c,d,e)
- ENV4668 Environmental Fate and Transport (a,b,d,e)
- CGN4803C Civil, Environmental & Geomatics Engineering Design 1 (a,b,d,e)
- CGN4804C Civil, Environmental & Geomatics Engineering Design 2 (a,b,d,e)

In the Continuous Improvement Worksheet (CIW) at the end of the semester, the faculty provides a composite score (on a scale of 1-5 with 5 being highest) based on assignments, laboratory reports, exams, projects, and other assessments. A score less than 3.5 will result in an improvement strategy to be implemented in the following semester.

The faculty evaluates the content knowledge by giving scores (1 through 5, with 5 as the highest) for the following course-specific student learning outcomes:

- An ability to apply knowledge of mathematics, science, and engineering (a)
- An ability to identify, formulate, and solve engineering problems (e)
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (h)
- A knowledge of contemporary issues (j)
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (k)

COMMUNICATION (Written Communication, Oral Communication, Team/ Collaborative Communication): An ability to communicate and function on effective multi-disciplinary teams.

Students will be able to communicate ideas and results to diverse audiences using their knowledge of written, oral and graphical communication, function effectively on teams using their knowledge of team dynamics, team communication, social norms, and conflict management with respect to the following courses:

- CGN4803C Civil, Environmental & Geomatics Engineering Design 1
- CGN4804C Civil, Environmental & Geomatics Engineering Design 2

Students are required to write technical reports to be evaluated by the faculty members. Students in the design sequence, CGN4803C and CGN4804C, will present oral and written reports to the faculty and the industry members of the Department/Program Advisory Council. The faculty evaluates the content knowledge by giving scores (1 through 5, with 5 as the highest) for the following course-specific student learning outcomes:

- An ability to function on multi-disciplinary teams (d)
- An ability to communicate effectively (g)

Students receiving unsatisfactory evaluations by the faculty and industry jury will be required to restart the sequence in the following semester.

CRITICAL THINKING (Analytical Skills, Creative Skills, and Practical Skills): Students will apply their discipline-specific knowledge to successfully execute a design with multiple realistic constraints using applicable design codes and standards, conduct experiments, analyze and interpret data, understand professional and ethical responsibility, and recognize the need for engaging in life-long learning.

All environmental engineering courses contain a critical thinking component. The following courses have more in depth critical thinking components:

- CWR4202 Hydrologic Engineering
- ENV4514 Water and Wastewater Treatment Systems
- ENV4612 Introduction to Pollution Prevention and Sustainability
- ENV4356 Solid and Hazardous Waste and Site Remediation
- ENV4668 Environmental Fate and Transport
- CGN4803C Civil, Environmental & Geomatics Engineering Design 1
- CGN4804C Civil, Environmental & Geomatics Engineering Design 2

Analytical skills are assessed through examining the quality of components of design work through oral presentations and/or technical reports. Creative and practical skills are assessed by the instructor examining the quality of the technical solution to a practical problem. The critical thinking skills that students obtained from the above group of courses will be evaluated by the faculty members who teach the courses by giving composite scores (1 through 5, with 5 as the highest) based on assignments, laboratory reports, exams, projects, and other assessments in the Continuous Improvement Worksheet (CIW) at the end of the semester for the following course-specific student learning outcomes:

- An ability to design and conduct experiments, as well as to analyze and interpret data (b)
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability (c)
- An understanding of professional and ethical responsibility (f)
- A recognition of the need for and an ability to engage in life-long learning (i)

The benchmark student success is 3.5. A score less than 3.5 will result in an improvement strategy to be implemented in the following semester.