

Environmental Engineering

In the College of Engineering

OFFICE: Engineering 424
TELEPHONE: (619) 594-6071
EMAIL: environmental@engineering.sdsu.edu

Faculty

Emeritus: Stratton
Chair: Supernak
The Blasker Chair in Environmental Engineering: Guroł
Professor: Guroł
Assistant Professors: Badriyha, Buyuksonmez

Offered by the Department of Civil and Environmental Engineering

Doctor of Philosophy degree in engineering sciences/applied mechanics.
Master of Science degree in civil engineering.
Concentration in environmental engineering.
Major in environmental engineering with the B.S. degree.

Mission of the Department

The mission of the Department of Civil and Environmental Engineering is to provide a high quality undergraduate and graduate education in the civil and environmental engineering areas as well as the advising and other support needed to ensure the students' academic success and preparation for a productive engineering career. In addition, through research and continuing professional development, the faculty produce, enhance and promote new developments within their areas of expertise for the benefit of society and the furtherance of their profession.

The objective of the program is to give the student a basic knowledge of civil and environmental engineering, as well as the interdisciplinary background and skills to meaningfully participate in and contribute technical advances toward this profession. The program integrates technical aspects with studies in the social sciences and humanities to ensure appropriate sensitivity to socially related problems.

Instruction is given both at the undergraduate level, leading to the bachelor's degree, and at the graduate level, leading to the master's or doctoral degrees. The undergraduate program builds upon concepts of mathematics, physics, chemistry and basic engineering with specialized study in civil and environmental engineering. Engineering design is emphasized, particularly in conjunction with computer utilization and practical civil and environmental engineering problems. Aspects of safety and engineering ethics are woven throughout the program. Breadth and depth of social science and humanities studies is assured by department approved courses. Completion of the undergraduate degree prepares the student for an entry-level professional position in addition to informal or formal graduate studies.

Many students who complete the civil or the environmental undergraduate program choose to continue their formal studies on a full or part-time basis at San Diego State University or at another institution. (See the *Bulletin of the Graduate Division* for additional information.) The objective of the graduate program is to broaden the student's technical competence and design abilities and allow for additional specialization.

The civil and environmental engineering program is enhanced through cooperation with the American Society of Civil Engineers, the American Public Works Association, the Associated General Contractors, the Chi Epsilon Civil Engineering Honor Society, and other national organizations who sponsor student chapters to further aid the student's professional development. The chapters at San Diego State University have won many awards in regional and national competition with other schools throughout the country.

Educational Objectives

The objectives of the environmental engineering program at San Diego State University are:

1. To graduate engineers with core competency in multiple areas of the environmental engineering profession.
2. To inspire in students the logical thinking approach to problem solving based on sound science, engineering principles, and economic considerations.
3. To prepare students for the challenges ahead in the work place and for the ethical, social, and legal dilemmas associated with environmental issues.
4. To instill in graduates a quest for knowledge and self-improvement through continual, life-long learning and professional interaction.

The Blasker Chair in Environmental Engineering

The Blasker Chair in Environmental Engineering was established by an endowment from the Blasker-Rose-Miah Endowment Fund of the San Diego Foundation. The fund was created in honor of Mr. Samuel Blasker who left \$8.0 million to the San Diego Foundation. Mr. Blasker was a successful aeronautical engineer and a business man with a vision to nurture and develop unique and innovative discoveries and experiences which may be of benefit to humanity.

The first appointee to the Chair, Dr. Mirat D. Guroł, is an accomplished scholar and researcher in the areas of innovative treatment technologies of contaminated water, air, soil, and hazardous waste.

Transfer Credit

No credit will be given for upper division engineering coursework taken at an institution having an engineering program which has not been accredited by the Accreditation Board for Engineering and Technology, Inc., unless the student successfully completes the first 12 units of engineering work attempted at this university. At that time, and upon recommendation of the department, unaccredited work will be evaluated for full or partial credit.

General Education

Students will complete a minimum of 50 units in General Education, to include a minimum of nine upper division units taken after attaining junior class standing. No more than twelve units may be used for General Education credit from any one department or academic unit. No more than 7 units from one department can be used in Sections II, III, and IV combined (Foundations, American Institutions, and Explorations).

I. Communication and Critical Thinking: 9 units

1. Oral Communication (3 units)
2. Composition (3 units)
3. Intermediate Composition and Critical Thinking (3 units)

II. Foundations: 29 units

A. Natural Sciences and Quantitative Reasoning (17 units):

1. Physical Sciences (11 units)
Engineering students will take Chemistry 200 which includes a laboratory (5 units).
Physics 195 (3 units)
Physics 196 (3 units)

- 2. Life Sciences (3 units)
Environmental engineering majors will take Biology 201, 3 units applicable to General Education.
- 3. Laboratory (satisfied under A.1. above)
- 4. Mathematics/Quantitative Reasoning
Engineering students will take Mathematics 150, 3 units applicable to General Education
- B. Social and Behavioral Sciences (3 units)
- C. Humanities (9 units)
Complete three courses in three different areas. One of these courses and the one under IV.A. below must be taken in the same department

III. American Institutions: Three units of the six units of coursework which meet the American Institutions graduation requirement may be used in General Education, excluding courses numbered 500 and above.

IV. Explorations: Total: 9 units; must include one course of cultural diversity.

- A. Upper division Humanities (3 units)
Three units must be taken from the same department as one of the Humanities courses selected in Foundations.
- B. Upper division Humanities (3 units from a department not selected in A above.)
- C. Upper division Social and Behavioral Sciences (3 units)

The Major

Environmental engineering involves the identification and design of solutions for environmental problems. Society's most crucial environmental problems, such as providing safe drinking water, treatment and proper disposal of wastes, water and air pollution control, remediation of sites contaminated with spills or improper disposal of hazardous substances, are handled by environmental engineers. Environmental engineers are technical professionals who possess the scientific knowledge to identify, design, build and operate systems that protect the environment from the impact of human activities, and as such make modern society possible.

The environmental engineering field and environmental engineering education are multidisciplinary. The B.S. degree provides a solid foundation in the fundamentals of mathematics, physics, chemistry, and engineering design that are needed to practice the profession or to pursue a graduate degree. Environmental engineering education also includes a range of other disciplines, such as biology, computer science, ecology, economics, geological sciences, and public health. To be able to address the spectrum of issues facing the environment, environmental engineers are broadly educated, as well as technically trained.

Environmental engineers are needed in both the private and public sectors. They are employed by engineering consulting firms that work in environmental pollution control, industries that need to comply with pollution emission and discharge regulations, private and municipal agencies that supply drinking water, treat and dispose wastes,

ENVIRONMENTAL ENGINEERING MAJOR

FRESHMAN YEAR

| <i>Fall Semester</i> | <i>Units</i> | <i>Spring Semester</i> | <i>Units</i> |
|--|--------------|--|--------------|
| ENV E 101, Environmental Engr. Seminar | 1 | Chemistry 130, Elementary Organic Chemistry | 3 |
| Chemistry 200, General Chemistry | 5 | CIV E 160, Statistical Methods for CEE | 2 |
| Mathematics 150, Calculus I | 5 | Mathematics 151, Calculus II | 4 |
| Biology 201, Principles Organismal Biology | 4 | Physics 195, Principles of Physics | 3 |
| | | General Education | 3 |
| | 15 | | 15 |

SOPHOMORE YEAR

| <i>Fall Semester</i> | <i>Units</i> | <i>Spring Semester</i> | <i>Units</i> |
|--|--------------|--|--------------|
| ENV E 101, Environmental Engr. Seminar | 1 | CIV E 253, Geology for Engineers | 2 |
| EM 202, Mechanics for Electrical Engrs | 3 | Engineering 280, Methods of Analysis | 3 |
| Mathematics 252, Calculus III | 4 | Physics 197, Principles of Physics | 3 |
| Physics 196, Principles of Physics | 3 | General Education | 6 |
| General Education | 6 | American Institutions | 3 |
| | 17 | | 17 |

JUNIOR YEAR

| <i>Fall Semester</i> | <i>Units</i> | <i>Spring Semester</i> | <i>Units</i> |
|---|--------------|---|--------------|
| ENV E 355, Environmental Engineering | 3 | Biology 315, Ecology & Human Impacts on Environment | 3 |
| ENGR 430, Principles of Engr. Economy | 3 | CIV E 444, Applied Hydraulics | 3 |
| EM 340, Fluid Mechanics | 3 | ENV E 553, Environmental Engr. Lab | 3 |
| EM 341, Fluid Mechanics Lab | 1 | ENV E 554, Process Fundamentals Env. Systems | 3 |
| ME 352, Thermo. & Heat Transfer | 3 | #Professional Electives | 3 |
| General Education | 3 | General Education | 3 |
| | 16 | | 18 |

SENIOR YEAR

| <i>Fall Semester</i> | <i>Units</i> | <i>Spring Semester</i> | <i>Units</i> |
|--|--------------|---|--------------|
| CIV E 462, Geotechnical Engineering | 3 | ENV E 560, Environmental Engr. Design | 3 |
| ENV E 555, Water and Wastewater Engr. | 3 | #Professional Electives | 3 |
| ENV E 556, Air Quality Management | 3 | General Education | 6 |
| ENV E 558, Solid Waste Management | 3 | American Institutions | 3 |
| General Education | 3 | | |
| | 15 | | 15 |

Approved as part of the student's master plan.

government agencies that monitor and regulate waste discharges and air emissions, private and government laboratories, and universities that conduct environmental research, international agencies that transfer knowledge to the developing world, and public-interest groups that advocate environmental protection.

Environmental Engineering Major

With the B.S. Degree (Major Code: 09221)

NOTE: See chart on the preceding page for the recommended sequence of courses for the major in environmental engineering.

All students in environmental engineering pursue a common program of study in basic sciences, engineering, and environmental engineering fundamentals and design. The program allows six units of "professional electives" which can be selected from available courses in environmental chemistry, environmental microbiology, water resources, and other areas. *The students choice of elective courses must be made in consultation with the adviser and documented by the filing of an approved master plan during or prior to the first semester of their junior year.*

Upper Division Writing Requirement. Passing the University Writing Examination or completing one of the approved writing courses with a grade of C (2.0) or better.

COURSES (ENV E)

LOWER DIVISION COURSES

101. Environmental Engineering Seminar (1)

Breadth and depth of environmental engineering field through presentations by invited faculty, graduate students, guests and seminar enrollees; including individual library research with written and oral presentations on selected environmental topics. Maximum credit two units. (Formerly numbered Civil and Environmental Engineering 101.)

296. Experimental Topics (1-4)

Selected topics. May be repeated with new content. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

UPPER DIVISION COURSES (Intended for Undergraduates)

320. Designing Solutions for Environmental Problems (3) I, II

Prerequisites: Upper division standing and completion of the General Education requirement in Foundations, II.A. Natural Sciences and Quantitative Reasoning.

Human interaction with the land, water and air environment; environmental pollution; role of engineering in solving environmental problems. Not open to civil or environmental engineering majors. (Formerly numbered Engineering 320.)

355. Environmental Engineering (3) I, II

Prerequisite: Chemistry 200.

Causes and effects of environmental problems and engineering methods to control them. (Formerly numbered Civil and Environmental Engineering 355.)

496. Advanced Environmental Engineering Topics (1-3) I, II

Prerequisites: Minimum grade point average of 3.0 and consent of instructor.

Modern developments in environmental engineering. See Class Schedule for specific content. Maximum credit six units for any combination of Environmental Engineering 496, 499 and 596.

499. Special Study (1-3) Cr/NC I, II

Prerequisites: Minimum grade point average of 3.0 and consent of instructor.

Individual study in the area of environmental engineering. Maximum credit six units for any combination of Environmental Engineering 496, 499 and 596.

UPPER DIVISION COURSES (Also Acceptable for Advanced Degrees)

553. Environmental Engineering Laboratory (3)

Two lectures and three hours of laboratory.

Prerequisites: Chemistry 200 and Environmental Engineering 355.

Proof of completion of prerequisite required for Environmental Engineering 355: Copy of transcript.

Analysis of natural waters and wastewaters. Sampling and analysis of hazardous environmental pollutants. Techniques to analyze solid waste. (Formerly numbered Civil and Environmental Engineering 553.)

554. Process Fundamentals of Environmental Systems (3)

Prerequisites: Environmental Engineering 355 and Engineering Mechanics 340. **Proof of completion of prerequisites required:** Copy of transcript.

Equilibrium and kinetics of chemical and biological reactions of environmental systems. Considerations of mass-transfer and fluid dynamics in water quality management and air pollution control. (Formerly numbered Civil and Environmental Engineering 554.)

555. Water and Wastewater Engineering (3) I

Prerequisite: Environmental Engineering 355. **Proof of completion of prerequisite required:** Copy of transcript.

Water and wastewater. Physical, chemical and biological methods of treatment. Advanced waste treatment processes. Water reclamation. (Formerly numbered Civil and Environmental Engineering 555.)

556. Air Quality Management (3)

Prerequisite: Environmental Engineering 355. **Proof of completion of prerequisite required:** Copy of transcript.

Sources of air pollutants. Transportation, diffusion, and transformation of pollutants in the atmosphere. Measurement and control of air pollution. (Formerly numbered Civil and Environmental Engineering 556.)

558. Solid Waste Management (3) II

Prerequisite: Environmental Engineering 355. **Proof of completion of prerequisite required:** Copy of transcript.

Management of municipal solid waste from a civil engineering perspective, including waste minimization and recycling. Engineered volume reduction through composting, incineration, mechanical compaction, and other methods. Ultimate disposal, landfill design and legislative regulations. (Formerly numbered Civil and Environmental Engineering 558.)

560. Environmental Engineering Design (3)

Prerequisites: Environmental Engineering 555, 558 and Engineering 430.

Application of engineering principles and design techniques to design of environmental engineering projects. (Formerly numbered Civil and Environmental Engineering 560.)

596. Advanced Environmental Engineering Topics (1-3) I, II

Prerequisites: Minimum grade point average of 3.0 and consent of instructor.

Modern developments in environmental engineering. See Class Schedule for specific content. Maximum credit of six units for any combination of Environmental Engineering 496, 499 and 596 applicable to a bachelor's degree. Maximum combined credit of six units of Environmental Engineering 596 and 696 applicable to a 30-unit master's degree.

GRADUATE COURSES Refer to Bulletin of the Graduate Division.

For additional courses which are electives in the environmental engineering program, refer to "Civil Engineering" in this section of the catalog.