481 Environmental Chemistry: Equilibrium Concepts
Fall. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering. P: ((CEM 141 and CEM 142) or (CEM 151 and CEM 152)) or (CEM 181H and CEM 182H) (LB 171 and LB 172) and (ENE 280 or BE 230 or GLG 201 or GLG 301 or approval of department)
Chemistry of natural environmental systems and pollutants. Equilibrium concepts and calculations for acid-base, solubility, complexation, redox and phase partitioning reactions and processes. Applications to ecosystem analysis, pollutant fate and transport, and environmental protection.

483 Water and Wastewater Engineering
Fall. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering. P: (ENE 280 or BE 230) and (CE 321 or CHE 311)
Engineering and scientific basis and design of physical, chemical and biological methods for the treatment of drinking water and wastewater. Operation process selection and design.

485 Landfill Design
Spring. 3(3-0) Interdepartmental with Civil Engineering. Administered by Civil Engineering. P: ENE 280 and CE 312
Geotechnical and environmental design of solid waste landfills.

487 Microbiology for Environmental Science and Engineering
Spring. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering. P: ENE 280
Fundamentals of microbiology. Application of these concepts to environmental processes such as wastewater treatment, human health and bioremediation.

489 Air Pollution: Science and Engineering
Spring. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering. P: (CEM 141 or CEM 151 or LB 171) and (MTH 133 or MTH 153H or LB 119) and (ENE 280 or BE 230) and (CE 321 or CHE 311)
Introduction to air pollution. Elements of air pollution meteorology, climate change, atmospheric transformations and transport. Air pollution sources and methods for their control. The role of local, state and federal government in air pollution control.

490 Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to juniors or seniors in the Department of Civil and Environmental Engineering. Approval of department.
Environmental engineering problem of specific interest to the student and a faculty member. May be analysis or design.

492 Selected Topics in Environmental Engineering
Fall. Spring. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department.
Selected topics related to environmental engineering, fluid mechanics and hydrology.
Environmental Engineering—ENE

822  Groundwater Modeling
Spring of even years. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering.

823  Stochastic Groundwater Modeling
Spring of odd years. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering.
P: ENE 821 RB: Groundwater Hydrology, groundwater modeling

829  Mixing and Transport in Surface Waters
Fall of odd years. 3(3-0) Interdepartmental with Civil Engineering. Administered by Environmental Engineering.

861  Introduction to Risk and Reliability in Civil and Environmental Engineering
Fall. 1(1-0) Interdepartmental with Civil Engineering. Administered by Civil Engineering. Not open to students with credit in CE 810.
Characterization of variability using probabilistic and statistical methods.

880  Independent Study in Environmental Engineering
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Environmental Engineering majors.
Solution of environmental engineering problems not related to student's thesis.

890  Selected Topics in Environmental Engineering
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open to students in the Environmental Engineering major.
Selected topics in new or developing areas of environmental engineering.

892  Master's Research Project
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to masters students in the Environmental Engineering major. Approval of department.
Master's degree Plan B individual student research project. Original research, research replication, or survey and reporting on a research topic.

899  Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course.
Master's thesis research.

900  Research Strategies and Methods in Environmental Engineering and Science
Spring. 1(1-0) Interdepartmental with Geological Sciences. Administered by Environmental Engineering. R: Open to graduate students in the Department of Civil and Environmental Engineering and open to graduate students in the Department of Geological Sciences. Not open to students with credit in CE 900.
Criteria for quality research, scientific method, scientific arguments, statistical testing, critical thinking skills, reviewing journal articles, literature synthesis, writing proposals and papers, giving presentations, responsible conduct of research.

999  Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course.
Doctoral dissertation research.