Metropolitan State University of Denver

Environmental Engineering (EVE)

The Environmental Engineering program is a multidisciplinary degree between engineering and earth and atmospheric sciences offering a customized degree tailored to the students' interest and flexible to an ever-changing job market. Students may choose to take electives (15 credit hours minimum) in either department so they can gain practical experiences in a wide range of disciplines including civil engineering, geospatial sciences, meteorology and climate change, physical geography, geology, water resources, and/or sustainable systems. The EVE program integrates with other MSU Denver programs, centers such as Earth and Atmospheric Sciences, Political Science, Business Management, Communication Arts and Sciences, One World One Water (OWOW) etc.

The goal of the program is to prepare graduates for the future to identify, analyze, formulate, and design solutions to Civil/Environmental Engineering problems, both independently and in a team environment, apply considerations of technical, legal, regulatory, social, environmental, and economic factors towards managing multi-faceted and multi-disciplinary projects, communicate effectively in both technical and non-technical settings with co-workers, professional clients, and the public and demonstrate commitment and progress in lifelong learning, professional development, and leadership, including participation in continuing education courses, workshops, and/or graduate study, and the pursuit of licensure as a Professional Engineer.

Faculty – The top priority for faculty in the EVE program is teaching and advising. With many years of industrial experience, they bring their expertise, relevancy and currency to the classrooms.

Students – Faculty provide each student with individualized counseling, and advising in meeting graduation requirements. Many Environmental Engineering students are working part-time or full-time. The program offers several evening courses to accommodate the working student. The EVE program's collaboration with the Internship Center of the college offers possibilities for students to gain industrial experience and earn technical elective credits at the same time. All students who are considering a major in EVE are expected to consult with EVE faculty advisor.

ENVIRONMENTAL ENGINEERING
Department of Engineering & Engineering Technology
For Students Starting Fall 2019

A minimum grade of "C" is required for all prerequisites before a student can progress. A full-time student may complete the program in four years (total of eight semesters).

General Studies Courses

Written Communication Credits: **6**
Oral Communication Credits: **3**
Quantitative Literacy Credits: **4**

- MTH 1410 Calculus I Credits: 4

Arts and Humanities Credits: **6**

- See the General Studies section of the catalog for approved courses.

Historical Credits: **3**

- See the General Studies section of the catalog for approved courses.

Social and Behavioral Sciences I Credits: **3**

- See the General Studies section of the catalog for approved courses.

Social and Behavioral Sciences II Credits: **3**
Natural and Physical Sciences Credits: **10**

- CHE 1800 General Chemistry I Credits: 4
- CHE 1801 General Chemistry I Laboratory Credits: 1
- CHE 1810 General Chemistry II Credits: 4
- CHE 1811 General Chemistry II Laboratory Credits: 1

Global Diversity: **(0 TO 3 Credits)**
Multicultural Requirement (0 TO 3 credits)

The department recommends that this requirement be met along with the Arts and Humanities, Historical, or Social and Behavioral Sciences general studies choices.

General Studies Total: 38 credits

Required Prerequisite Courses

			Prerequisites	Credit Hours
	BIO 1080	General Biology I	Prerequisite(s): Minimum performance standard scores on reading, writing and mathematics preassessment placement tests Corequisite(s): BIO 1090	3
	BIO 1090	General Biology Laboratory I	Prerequisite(s): Minimum performance standard scores on reading, writing and mathematics preassessment placement tests Corequisite(s): BIO 1080	3
	MTH 2410	Calculus II	Prerequisite(s): MTH 1410 with a grade of "C" or better, or permission of instructor	4
	MTH 2420	Calculus III	Prerequisite(s): MTH 1410 with a grade of "C" or better, or permission of instructor	4
	MTH 3420	Differential Equations	Prerequisite(s): MTH 2420 with a grade of "C" or better, or Permission of instructor	4
	PHY 2311	General Physics I	Prerequisite(s): MTH 1410 Corequisite(s): Concurrent registration with PHY 2321 General Physics I Laboratory is recommended. Satisfaction of either ENG 1010 or the Oral Communication requirement.	4
	PHY 2321	General Physics I Laboratory	Prerequisite(s): MTH 1120 or equivalent; and satisfaction of either ENG 1010 or the Oral Communication requirement **Corequisite(s):** Concurrent registration with PHY 2311 is recommended	1
	PHY 2331	General Physics II	Prerequisite(s): MTH 2410, PHY 2311 or equivalent, and completion of either ENG 1010 or the Oral Communication requirement. Corequisite(s): Concurrent registration with PHY 2341 is recommended.	4

	PHY 2341	General Physics II Laboratory	Prerequisite(s): MTH 1120 or equivalent, and satisfaction of either ENG 1010 or the Oral Communication requirement Corequisite(s): Concurrent registration with PHY 2331 is recommended.	1

Required EVE Core Courses

	ENV 1200	Introduction to Environmental Science	Minimum performance standard scores on reading, writing, and mathematics preassessment placement tests	3
	EVE 3000	Concepts in Environmental Engineering	CHE 1800, CHE 1811, MTH 2410, ENV 1200	3
	EVE 3320	Environmental Impact Statements in Engineering	Junior standing or permission of instructor	3
	EVE 3400	Engineered Water	ENV 1200 or GEG 1920 and completion of General Studies	3
	EVE 4200	Environmental Policy in Engineering	ENV 1200 and completion of General Studies	3
	EVE 4420	Wetland Studies	ENV 1200 and completion of General Studies	3
	EVE 4450	Wood in Engineering	SSE 3135 with a grade of "C" or better or permission of instructor	3
	GEL 3420	Soil Resources	ENV 1200 and completion of General Studies	4
	SSE 1040	Life Cycle and Systems Engineering - An Introduction	(none)	3
	SSE 1215	Engineering Graphics: Solid Modeling	(none)	3
	SSE 2150	Mechanics of Static Systems	PHY 2311 and MTR 2410 with "C" or better, or permission of instructor	3
	SSE 3135	Strength of Materials with Laboratory	SSE 2150 with a grade of "C" or better, or permission of instructor	4
	SSE 3160	Mechanics of Dynamic Systems	SSE 2150 and MTH 3420 with grades of "C"' or better, or permission of instructor	3
	SSE 3185	Fundamental Fluid Mechanics	SSE 3160 with "C" or better, or permission of instructor	3
	SSE 4160	Geotechnical Engineering	SSE 3135 and SSE 3185 both with grades of "C" or better, or permission of instructor	3
	SSE 4610	Capstone: Thesis in Sustainable Development **This course satisfy the University's Senior Experience requirement.*	Departmental Permission	3

Elective Courses- students are required to take at least 15 credit hours from the list below to complete their major.

	BIO 1081	General Biology II	BIO 1080 and BIO 1090; or permission of instructor Corequisite(s): BIO 1091	3
	BIO 1091	General Biology Laboratory II	Prerequisite(s): BIO 1080 and BIO 1090; or permission of instructor Corequisite(s): BIO 1081	1
	CET 3330	Environmental Technology Processes	CHE 1100 or CHE 1800 with a grade of "C" or better, at least junior standing; or permission of instructor	3
	ENV 2000	Applied Pollution Science	ENV 1200, CHE 1800, and CHE 1810	3
	ENV 2100	Basic Water Sampling and Analysis	Completion of General Studies requirements in Written Communication, Oral Communication, Quantitative Literacy, and Natural and Physical Sciences	3
	ENV 3100	Air Pollution	ENV 1200 or MTR 2400	3
	ENV 3710	Environmental Remediation	ENV 1200, BIO 1091, CHE 1800, and junior standing; or permission of instructor	3
	ENV 3720	Waste Management	ENV 1200, BIO 1091, CHE 1800, and junior standing; or permission of instructor	3
	ENV 3730	Environmental Risk Assessment	ENV 1200, 9 hours coursework in any of the following Environmental Science, Geology, Physical Geography,	3

			Biology, Chemistry, and Meteorology courses, junior standing; or permission of instructor	
	ENV 4400	Landscape Ecology	ENV 1200, GIS 2250; or permission of instructor	3
	ENV 4440	Limnology	ENV 1200, BIO 1081, and BIO 1091; or permission of the instructor	3
	ENV 4450	Stream Ecology	ENV 1200, BIO 1081, and BIO 1091; or permission of the instructor	3
	ENV 4460	Advanced Water Quality Analysis	CHE 1800, CHE 1801, CHE 1810, CHE 1811, and ENV 2100	3
	GEL 4150	Hydrology (Surface Water)	GEG 1100 or GEG 1910 or ENV 3400 Prerequisite(s) or Corequisite(s): CSS 1010 or CIS 1010, MTH 1210	4
	GEL 4250	Hydrogeology (Groundwater)	GEL 1010, CHE 1800, MTH 1110 Prerequisite(s) or Corequisite(s): GEL 3420	4
	SSE 2200	Materials Science	CHE 1100/1150 with “C” or better, or permission of instructor	3
	SSE 3175	Modeling Structural Systems	SSE 3135 with “C” or better, or permission of instructor	3
	SSE 3300	Thermodynamics and Heat Transfer	SSE 2200, SSE 3135, and SSE 3160 with grades of “C” or better, or permission of instructor	3
	SSE 3500	Humanitarian Engineering	(none)	3
	SSE 4200	Sustainable Development Strategy	(none)	3

EVE Program Total: 129 credits

General Studies	***38 credits***
Required Prerequisite Courses	***26 Credits***
Required EVE Core	***50 credits***
Elective Courses	***15 credits***

EVE 3000 Concepts in Environmental Engineering
Credits: 3 (3+0)
Prerequisite(s): CHE 1800, CHE 1811, MTH 2410, ENV 1200
Description: In this course students are introduced to the interaction between humans, their activities, and the environment around us. Over the course of the semester, they will explore anthropogenic and natural effects on air and water quality, how these systems operate and the application of applied sciences (e.g., physics, chemistry, and biology) to the natural world. Students are presented with the major environmental challenges through case studies.

EVE 3320 Environmental Impact Statements in Engineering
Credits: 3 (3+0)
Prerequisite(s): Junior standing or permission of instructor
Description: In this course students will study the physical and legal requirements of the environmental impact statement process. Students will research and document case studies on environmental impact statement.

EVE 3400 Engineered Water
Credits: 3 (3+0)
Prerequisite(s): ENV 1200 or GEG 1920 and completion of General Studies
Description: This course presents an analysis of water as a major resource. It includes the study of the hydrologic cycle; competing water uses, current water problems, and approaches to water management. The relationship of water to land use is examined in terms of dams, watersheds, water laws, pollution, and flood control. Students will propose a design to conserve, reuse, and allocate fresh water resources in a developing country while considering geo-political consequences.

EVE 4200 Environmental Policy in Engineering
Credits: 3
Prerequisite(s): ENV 1200 and completion of General Studies
Description: This course provides an overview of policy related to environmental engineering and major environmental laws in the U.S. The major statutes are analyzed in terms of purpose, scope, implementation, compliance requirements, and impact on land use. Students will review applicable case law and case studies as they apply to current engineering practices.

EVE 4420 Wetland Studies
Credits: 3 (3+0)
Prerequisite(s): ENV 1200 and completion of General Studies
Description: This course offers a broad overview of wetland landscapes. Topics include: (1) Spatial distribution (local and national), (2) variations in wetlands topology (salt-water versus fresh-water and warmer versus colder climates), (3) relationships between wetlands (migratory flight paths), (4) wetlands ecosystems (5) human impacts on wetlands, (6) federal, state, and local wetlands regulations, and (7) international wetlands problems. Students will evaluate an engineered wetland and explore design, efficacy in nutrient removal and overall land use implications.

EVE 4450 Wood in Engineering
Credits: 3 (3+0)
Prerequisite(s): SSE 3135 with a grade of "C" or better or permission of instructor
Description: In this course students are introduced to applications of wood design in engineering. Analysis and design of wood structures is presented.

GEL 3420 - Soil Resources
Credits: 4
Prerequisite(s): ENV 1200 and completion of General Studies
Description: This course analyzes the materials and processes that combine to produce various soil types. Soil types are examined in relationship to climate, landforms, vegetation, and geology, as well as in relation to land-use patterns.
Field Trips: Required field trips investigate soil-mapping techniques

SSE 1040 - Life Cycle and Systems Engineering - An Introduction
Credits: 3
Description: Students in this course are introduced to life cycle analysis and systems engineering using principles and applications of systems analysis, life cycle cost analysis and basic quantitative methods. Classical and modern decision analysis techniques are employed for evaluating case studies in sustainable systems of mechanical, civil and electrical engineering.

SSE 1215 - Engineering Graphics: Solid Modeling
Credits: 3
Description: In this course students study solid modeling fundamentals, geometric constructions, multi-view projections, section views, and dimensioning using adequate CAD software.

SSE 2150 - Mechanics of Static Systems
Credits: 3
Prerequisite(s): PHY 2311 and MTR 2410 with "C" or better, or permission of instructor
Description: In this course, students study the principles of mechanics of static systems in two- and three-dimensions: static equilibrium of particles and rigid bodies; section properties; internal forces in statically determinate trusses and beams; friction; and virtual work.

SSE 3135 - Strength of Materials with Laboratory
Credits: 4
Prerequisite(s): SSE 2150 with a grade of "C" or better, or permission of instructor
Description: Students in this course are introduced to the fundamentals in the strength and deformation of engineering materials. Students focus on the development of constitutive relationships of materials under axial, torsion, transverse shear and bending loading conditions, and the engineering applications in the first part of the course. Students are introduced to beam-deflection and column-buckling theories and engineering solutions in the second part of the course. Students use laboratory time to enhance the knowledge and theories developed in the class and to use different equipment measuring engineering properties of various materials.

SSE 3160 - Mechanics of Dynamic Systems
Credits: 3
Prerequisite(s): SSE 2150 and MTH 3420 with grades of "C"' or better, or permission of instructor
Description: In this course, students are introduced to dynamics systems, including kinematics, and kinetics of particles and rigid bodies with engineering applications. Students also study the vibration systems in engineering applications.

SSE 3185 - Fundamental Fluid Mechanics
Credits: 3
Prerequisite(s): SSE 3160 with "C" or better, or permission of instructor
Description: Students in this course study physical properties of ideal fluids and real fluids. Course material includes fluid statics, kinematics and dynamics, energy and momentum principles of fluid mechanics, dimensional analysis and the applications of the theories and principles in incompressible flow in pipes, ducts, forces on immersed bodies and steady flow in open channels.

SSE 4160 - Geotechnical Engineering
Credits: 3
Prerequisite(s): SSE 3135 and SSE 3185 both with grades of "C" or better, or permission of instructor
Description: Students in this course are introduced to the basic principles of soil mechanics and fundamentals of geotechnical engineering. Students learn mechanical properties of soil, engineering classification of soil, permeability and seepage, consolidation and settlement, shear strength, lateral earth pressures, fundamentals of retaining structures, soil bearing capacity, slope stability and fundamentals of foundation designs.

SSE 4610 - Capstone: Thesis in Sustainable Development
Credits: 3
Prerequisite(s): Departmental Permission
Description: Students in this course write a thesis of an undergraduate research project. The project should reflect the growth of the development of engineering, technology, and human society with regard to sustainability and to meet the needs of sustainable development of industry and the community. The senior thesis projects generally are selected by students and emerged from collaboration with faculty/advisor. The thesis should demonstrate the general understanding of concepts of sustainable system engineering, together with exposition that sets the work in a holistic and systemic approach to solving problems and move beyond the tradition of breaking designs down into disconnected parts

University Requirement(s): Senior Experience

BIO 1081 - General Biology II
Credits: 3
Prerequisite(s): BIO 1080 and BIO 1090; or permission of instructor
Corequisite(s): BIO 1091
Description: This course is a continuation of General Biology I (BIO 1080). Coursework emphasis is placed on evolution, ecology, and the classification, diversity, and structure of plants and animals.

BIO 1091 - General Biology Laboratory II
Credits: 1
Prerequisite(s): BIO 1080 and BIO 1090; or permission of instructor
Corequisite(s): BIO 1081
Description: This mandatory laboratory accompanies BIO 1081. This course will explore and reinforce concepts introduced in BIO 1081 through laboratory and field exercises in ecology, evolution and diversity.

CET 3330 - Environmental Technology Processes
Credits: 3
Prerequisite(s): CHE 1100 or CHE 1800 with a grade of "C" or better, at least junior standing; or permission of instructor
Description: This course covers chemistry basics, acid-base reactions, biochemical processes and reactions. Also included is an overview of water and wastewater processes following fieldtrip(s) in this area.

ENV 2000 - Applied Pollution Science
Credits: 3
Prerequisite(s): ENV 1200, CHE 1800, and CHE 1810

Description: This course introduces students to the abiotic and biotic scientific processes within the soil/water/atmosphere continuum that affects the fate and transport of pollutants. The extent, fate, mitigation, and impact of environmental pollution will be examined through applied examples and case studies.

ENV 2100 - Basic Water Sampling and Analysis
Credits: 3
Prerequisite(s): Completion of General Studies requirements in Written Communication, Oral Communication, Quantitative Literacy, and Natural and Physical Sciences
Description: Water quality information, including the consequences of pollution and other disturbances, is commonly used to indicate the health of an ecosystem. This course exposes students to the methods and techniques used in water quality sampling. Students will learn how to collect water samples in the field, analyze their results, and summarize the implications of the results. Students will also have the opportunity to learn how to collect and identify aquatic insects as an indicator of environmental health.
Field Trips: Field sampling of the Cherry Creek and a one-day field trip on a weekend are mandatory.

ENV 3100 - Air Pollution
Credits: 3
Prerequisite(s): ENV 1200 or MTR 2400
Description: This course examines the causes and control of air pollution. Topics include pollutant sources and sinks, regional and global-scale pollution problems, monitoring and sampling techniques, regulatory control, meteorological influences, and indoor air quality.

ENV 3710 – Environmental Remediation
Credits: 3
Prerequisite(s): ENV 1200, BIO 1091, CHE 1800, and junior standing; or permission of instructor
Description: This course presents technologies available for reclaiming contaminated sites and reducing health risks. Physical, chemical, and biological technologies will be examined for the cleanup of hazardous wastes. Students will integrate the nature of hazardous wastes, the behavior of chemicals at the surface and subsurface, and technological applications. Students will design a monitoring program for assessing the applicability of site cleanup and analyze the data from a site monitoring program.

ENV 3720 - Waste Management
Credits: 3
Prerequisite(s): ENV 1200, BIO 1091, CHE 1800, and junior standing; or permission of instructor
Description: Waste generation, human health, waste treatment, disposal methods, recycling as well as environmental hazards will be examined in this course. Students will research the policies that govern transportation and disposal of waste. Laws and agency regulations will be examined to determine their effectiveness in reducing, remediating, and containing waste.

ENV 3730 - Environmental Risk Assessment
Credits: 3
Prerequisite(s): ENV 1200, 9 hours coursework in any of the following Environmental Science, Geology, Physical Geography, Biology, Chemistry, and Meteorology courses, junior standing; or permission of instructor
Description: Risk is an important component of regulatory decision making. Since risk assessment has no "correct" answers, this course explores what risk perception, risk management, and risk communication mean. Students will learn how to weigh the costs and benefits of risk reduction and how to evaluate the uncertainties in risk estimates. Case studies will be used to help explain the principles.

ENV 4400 - Landscape Ecology
Credits: 3
Prerequisite(s): ENV 1200, GIS 2250, and ENV 4430; or permission of instructor
Description: Students will examine the effects of spatial pattern and scale on ecological processes. Concepts, tools, and techniques that enhance the effectiveness of watershed and ecosystem management, design of green infrastructure, and smart growth are explored. Students will learn how the concepts of landscape ecology apply to environmental policy, management, regulation, and assessment.

ENV 4440 - Limnology
Credits: 3
Prerequisite(s): ENV 1200, BIO 1081, and BIO 1091; or permission of the instructor
Description: This course examines the study of lakes, reservoirs, and ponds as inland water ecosystems. The physical, chemical, and biological components of inland waters are examined. The course investigates how lakes are formed and how they evolve over time. The shape of the lake basin, its water balance, and the catchment area are studied with respect to their influence on the ecology within the lake. Students learn how to assess the health of a lake, how to examine water quality, how to handle aquatic weed problems, and how to manage a lake fishery.
Field Trips: A one-day field trip to a lake, pond, or reservoir is required.

ENV 4450 - Stream Ecology
Credits: 3
Prerequisite(s): ENV 1200, BIO 1081, and BIO 1091; or permission of the instructor
Description: This course explores the diversity of running water ecosystems throughout the world by examining the chemistry, physical features, and biology of stream ecosystems. Principles of stream ecology will be used to examine local stream ecosystems ranging from those found in the mountains to the prairies. The relationship among a stream, its watershed, floodplain, and riparian zone will be studied. Human activities that alter water quality, chemistry, and the ecology of a stream will be investigated, as well as methods to mitigate and protect lotic (flowing water) ecosystems.
Field Trips: Students will have an opportunity to apply what they have learned in the classroom during a mandatory, one-day field trip

ENV 4460 - Advanced Water Quality Analysis
Credits: 3
Prerequisite(s): CHE 1800, CHE 1801, CHE 1810, CHE 1811, ENV 2100, and ENV 3400
Description: This course examines the interplay between humans, our activities, and water quality. Topics include nutrient cycling, water and wastewater treatment, chemical and biological contamination, and hydraulics. This course uses problem based learning through modeling to examine water quality using real world examples and mass balance evaluations. Field trips to water and wastewater treatment plants are required.

GEL 4150 - Hydrology (Surface Water)
Credits: 4
Prerequisite(s): GEG 1100 or GEG 1910 or ENV 3400
Prerequisite(s) or Corequisite(s): CSS 1010 or CIS 1010, MTH 1210
Description: In this course, students examine surface waters with respect to water flow, drainage systems, storage, pollution and environmental relationships. The hydrologic cycle is studied with respect to the amount and distribution of water, the movement and fluxes of water and current water-related issues. Topics addressed include hydrologic data sources, statistical analysis in hydrologic problem-solving, hydrograph analysis, hydrographic routing, hydrologic modeling and current challenges ofurban hydrology, hydrologic models and hydrologic design.

GEL 4250 - Hydrogeology (Groundwater)
Credits: 4
Prerequisite(s): GEL 1010, CHE 1800, MTH 1110
Prerequisite(s) or Corequisite(s): GEL 3420
Description: This course is a practical approach to the study of groundwater with emphasis on water quality, underground flow, pumping, and infiltration/recharge principles in relationship to the geologic environment. The course includes practical methods of laboratory water quality testing, groundwater flow analysis and experimentation, as well as septic system design and evaluation. Since mathematical models are involved, familiarity with graphing and algebraic operations is of essence. A foundational knowledge in geology is prerequisite.
Field Trips: Self-guided group fieldtrips are required for this course.

SSE 2200 - Materials Science
Credits: 3
Prerequisite(s): CHE 1100/1150 with "C" or better, or permission of instructor
Description: In this lecture/laboratory course, students are introduced to basic properties of materials, including the properties and behavior that govern their selection and design with emphasis on sustainable practices. Students study materials including ferrous and non-ferrous metals, composites, plastics, ceramics, glass, wood, rubber and adhesives.

SSE 3175 - Modeling Structural Systems
Credits: 3
Prerequisite(s): SSE 3135 with "C" or better, or permission of instructor
Description: In this course, students study the modeling for structural analysis and design. It focuses on the interaction of the components and their behavior within a structural system. The basic concepts of structural modeling are introduced first, followed by the evolution of structural analysis, and then the analysis methods and types are presented, along with the discussion of interactions within structural systems.

SSE 3300 - Thermodynamics and Heat Transfer
Credits: 3
Prerequisite(s): SSE 2200, SSE 3135, and SSE 3160 with grades of "C" or better, or permission of instructor
Description: In this course, students examine the fundamental laws of thermodynamics. Students are introduced to basic concepts of energy, thermodynamic systems, dimensions and units, and the ideal-gas equation of state. Students are introduced to concepts through the study of closed and open systems. Students analyze heat engines and reversible and irreversible processes. Additionally, students learn and apply the three basic mechanisms of heat transmission. Conduction, convection (free and forced), plus radiant transmission are treated for both steady-state and transient conditions. Student learning is aided by computer solutions.

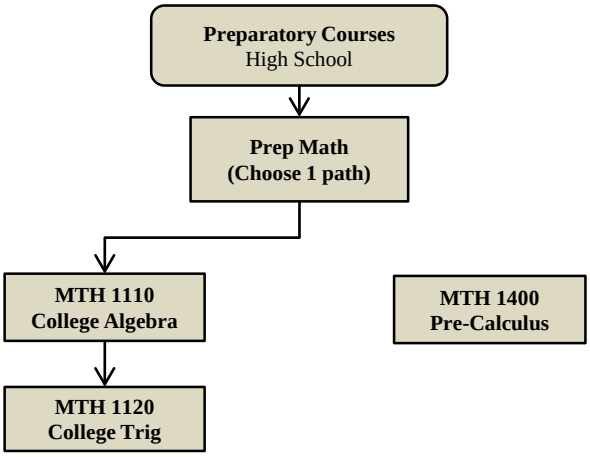
SSE 3500 - Humanitarian Engineering
Credits: 3
Description: In this course, students are introduced to humanitarian engineering through hands-on instruction and project work in tandem with lectures. Students design and implement a sustainable community project that helps an underrepresented community to meet the population's basic engineering needs. This project is based on knowledge of relevant community development methodologies that students are introduced to through

lecture. Students learn to apply Appropriate Design concepts, as well as development implementation strategy with respect to sustainability, and design for community. Students compare and contrast engineering for developing community systems strategies with the traditional design process.

SSE 4200 - Sustainable Development Strategy
Credits: 3
Description: In this course, students are introduced to the role of engineering in development, and they examine how actions lead to intended and unintended consequences. Emphasis is placed on sustainability principles with regards to planning and design. Students study development strategy on large, modern world scale and also for communities where the social, political, and economic systems differ from those most commonly experienced by engineers in the developed world. The students are also introduced to a framework and guidelines for conducting both large- and small-scale development projects. The course addresses analysis of communities in medium- to high-risk and low-resilience environments. The framework combines concepts and tools that have been traditionally used by development agencies and other tools more specifically used in engineering project management. Finally, students are introduced to the various leadership skills necessary to make decisions in complex and uncertain environments.

See Prerequisites for all classes

Metropolitan State University of Denver



Recommended course rotation:

Freshman Year

1st Semester (Fall)

18 hours

- **ENV 1200 (3)** *Introduction to Environmental Science*
- **MTH 1410 (4)** *Calculus I*
- **CHE 1800 (4)** *General Chemistry*
- **CHE 1801(1)** *General Chemistry I Lab*
- **General Studies (3)** *Written Communication*
- **General Studies (3)** *Historical*

2nd Semester (Spring)

17 hours

- **General Studies (3)** *Arts & Humanities*
- **MTH 2410 (4)** *Calculus II*
- **BIO 1080 (3)** *General Biology I*
- **BIO 1090 (1)** *General Biology I Lab*
- **General Studies (3)** *Written Communication*
- **General Studies (3)** *SBS I*

Sophomore Year

3rd Semester (Fall)

17 hours

- **EVE 3000 (3)** *Concepts in Environmental Engineering*
- **MTH 2420 (4) Calculus III**
- **CHE 1810 (4)** *General Chemistry II*
- **CHE 1811(1)** *General Chemistry II Lab*
- **PHY 2311 (4)** *General Physics I*
- **PHY 2321 (1)** *General Physics I Lab*

4th Semester (Spring)

15 hours

- **EVE 3320 (3)** *EIS in Engineering*
- **General Studies (3)** *Oral Communication*
- **SSE 1040 (3)** *Life Cycle and Systems Engineering-An Introduction*
- **SSE 1215 (3)** *Engineering Graphics-Solid Modeling*
- **SSE 2150 (3)** *Mechanics of Statics Systems*

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Junior Year

5th Semester (Fall)

16 hours

- **SSE 3135 (4)** *Strength of Materials with Laboratory*
- **MTH 3420 (4)** *Differential Equations*
- **PHY 2331 (4)** *General Physics II*
- **PHY 2341(1)** *General Physics II Lab*
- **General Studies (3)** *SBS II*

6th Semester (Spring)

12 hours

- **SSE 3160 (3)** *Mechanics of Dynamics Systems*
- **General Studies (3)** *Arts and Humanities*
- **Approved Elective** *3 credits*
- **Approved Elective** *3 credits*

Senior Year

7th Semester (Fall)

18 hours

- **SSE 3185 (3)** *Fundamental Fluid Mechanics*
- **EVE 3400 (3)** *Engineered Water*
- **EVE 4200 (3)** *Environmental Policy in Engineering*
- **EVE 4420 (3)** *Wetland Studies*
- **Approved Elective** *3 credits*
- **Approved Elective** *3 credits*

8th Semester (Spring)

16 hours

- **SSE 4160 (3)** *Geotechnical Engineering*
- **SSE 4610 (3)** *Capstone: Thesis in Sustainable Development*
- **EVE 4450 (3)** *Wood in Engineering*
- **GEL 3420 (4)** *Soil Resources*
- **Approved Elective** *3 credits*

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