Civil and Environmental Engineering

Phillip Thompson, PhD, PE, Chair

Objectives

Civil engineering is the knowledge of mathematical and physical sciences to provide structures, improve and protect the environment, and provide facilities for community living, industry, and transportation for the use of mankind.

The mission of the Civil and Environmental Engineering Department is to provide educational opportunities for students seeking to enter the civil engineering profession, so that they can achieve competence in the field while recognizing their social responsibilities. The program provides a strong foundation in the areas of mathematics, basic and engineering sciences, and the humanities and social sciences. It encourages further self development and life-long intellectual achievement. The program seeks to build student skills in written and oral communication, and a sense of poise and professionalism.

Analysis and design courses in the fields of environmental, geotechnical, hydraulic, structural, and water resources engineering are offered in addition to preparatory courses in sciences and basic mechanics. A broad base of theory is provided, along with its application to current practices of the profession.

The program objectives of the civil engineering program are to prepare graduates in the following areas:

- Technical Proficiency: Ability to apply a technical core of knowledge in mathematics, science, and civil engineering, which includes understanding the fundamentals of several recognized civil engineering areas (e.g., environmental, geotechnical, structural, and water resources engineering).
- Communications Skills: Ability to communicate effectively including writing, speaking, listening, and observing and to use graphics, the worldwide web, and other communication tools.
- Professional Skills: Ability to use the broad spectrum of skills needed in professional practice including teamwork, leadership, and project and business management, and an understanding of professional ethics, contemporary issues, safety, and economics.
- Personal Breadth: Understanding of non-technical aspects of engineering, including ethical considerations, concern for society and the environment, and multi-cultural perspectives, as well as a commitment to life-long learning and service to the professional and civic communities.

Degree Offered

Bachelor of Science in Civil Engineering

Majors Offered

Civil Engineering Civil Engineering with specialization in Environmental Engineering

Minor Offered

Environmental Engineering

Departmental Requirements

In addition to the prerequisites, departmental candidacy in one of the engineering departments is required for entry into 300- and 400-level courses. Candidacy is achieved by successfully completing all required 100- and 200-level engineering, chemistry, computer science, mathematics, and physics courses with a combined grade point average of at least 2.50, as well as ENGL 110. Only courses graded C (2.00) or higher may be transferred into the department to offset degree requirements.

For graduation, a minimum 2.50 cumulative grade point average is required, as well as a minimum 2.50 average in Seattle University classes in science, computer science, physics, mathematics, and engineering courses.

Taking the Washington state Fundamentals of Engineering (FE) examination is required for the degree. The civil engineering program is accredited by the Engineering Accreditation Commission of ABET, formerly known as the Accreditation Board for Engineering and Technology.

Bachelor of Science in Civil Engineering Major in Civil Engineering

In order to earn the bachelor of science in civil engineering degree, students must complete a minimum of 192 credits including 45 credits in core curriculum, with a cumulative and major/department grade point average of 2.50, including the following:

I. Core Curriculum Requirements

Students majoring in civil engineering must earn a minimum of 45 credits in the core curriculum.

ENGL 110	College Writing: Inquiry and Argument	5
PHIL 110	Introduction to Philosophy and Critical Thinking	5
Choose one of the follo	owing two courses:	5
HIST 120	Origins of Western Civilization	
HIST 121	Studies in Modern Civilization	
ENGL 120	Introduction to Literature	5
PHIL 220	Philosophy of the Human Person	5
Social Science I (not	economics)	5
Social Science II satis	sfied by CEEGR 302	
Theology and Religio	ous Studies Phase II (200-299)	5
Ethics (upper division	n)	5
Theology and Religio	ous Studies Phase III (300-399)	5
Interdisciplinary satis	sfied within major.	
Senior synthesis fille	d by CEEGR 487, 488, 489.	

II. Major Requirements

83 creaits, including:		
CEEGR 105	Civil Engineering Graphics and Communication	3
CEEGR 221	Mechanics of Materials I	4
CEEGR 222	Mechanics of Materials Lab I	2
CEEGR 302	Engineering Economy	3
CEEGR 311	Engineering Measurements	4
CEEGR 323	Mechanics of Materials II	5
CEEGR 331	Fluid Mechanics	4
CEEGR 335	Applied Hydraulics	5
CEEGR 337	Fluids Lab	1

CEEGR 342	Environmental Engineering Chemistry 4
CEEGR 351	Engineering Geology 4
CEEGR 353	Soil Mechanics
CEEGR 371	Water Resources I 3
CEEGR 445	Structural Mechanics 5
CEEGR 473	Principles of Environmental Engineering
CEEGR 487	Engineering Design I 4
CEEGR 488	Engineering Design II 4
CEEGR 489	Engineering Design III 4
Choose elective sequer	nce a or b:
a. CEEGR 447	Structural Design I
CEEGR 449	Structural Design II
b. CEEGR 474	Water Supply and Wastewater Engineering
CEEGR 475	Hazardous Waste Engineering
Choose one of the follo	wing five courses:
CEEGR 425	Transportation Engineering
CEEGR 455	Foundation Design
CEEGR 472	Water Resources II
CEEGR 476	Environmental Law and Impact Studies
CEEGR 486	Green Engineering
III. Other Major D	epartment Requirements
III. Other Major Do CHEM 121	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131	e partment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 136	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 136 MATH 232	epartment Requirements General Chemistry I
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 136 MATH 232 MATH 233	epartment RequirementsGeneral Chemistry I4General Chemistry Lab I1Statics4Dynamics4Engineering Methods4Calculus I5Calculus III5Calculus III5Multivariable Calculus3Linear Algebra3
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 136 MATH 232 MATH 233 MATH 234	epartment RequirementsGeneral Chemistry IGeneral Chemistry Lab I1Statics4Dynamics4Engineering Methods4Calculus I5Calculus III5Calculus III5Multivariable Calculus3Linear Algebra3Differential Equations
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 135 MATH 232 MATH 233 MATH 234 Choose one of the follo	epartment RequirementsGeneral Chemistry IGeneral Chemistry Lab IStaticsMultivariable CalculusStaticsSubstrain AlgebraSubstrain AlgebraSubstrain Strain StrainStaticsSubstrain
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 136 MATH 232 MATH 233 MATH 234 Choose one of the follo MATH 244	epartment RequirementsGeneral Chemistry I4General Chemistry Lab I1Statics4Dynamics4Engineering Methods4Calculus I5Calculus III5Calculus III5Multivariable Calculus3Linear Algebra3Differential Equations4Swing two courses:5Probability and Statistics
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 135 MATH 232 MATH 233 MATH 234 Choose one of the follo MATH 244 MATH 351	epartment RequirementsGeneral Chemistry I4General Chemistry Lab I1Statics4Dynamics4Engineering Methods4Calculus I5Calculus III5Calculus III5Multivariable Calculus3Linear Algebra3Differential Equations4Owing two courses:5Probability5
III. Other Major Data CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 232 MATH 233 MATH 234 Choose one of the follow MATH 251 PHYS 121	epartment RequirementsGeneral Chemistry I4General Chemistry Lab I1Statics4Dynamics4Engineering Methods4Calculus I5Calculus III5Calculus III5Multivariable Calculus3Linear Algebra3Differential Equations4owing two courses:5Probability and Statistics5Probability5Mechanics5
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 135 MATH 232 MATH 233 MATH 234 Choose one of the follo MATH 244 MATH 351 PHYS 121 PHYS 122	General Chemistry I 4 General Chemistry Lab I 1 Statics 4 Dynamics 4 Engineering Methods 4 Calculus I 5 Calculus III 5 Calculus III 5 Multivariable Calculus 3 Linear Algebra 3 Differential Equations 5 Probability and Statistics 5 Probability 5 Mechanics 5 Electricity and Magnetism 5
III. Other Major De CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 135 MATH 232 MATH 232 MATH 233 MATH 234 Choose one of the follo MATH 244 MATH 351 PHYS 121 PHYS 122 PHYS 123	epartment RequirementsGeneral Chemistry I4General Chemistry Lab I1Statics4Dynamics4Engineering Methods4Calculus I5Calculus III5Calculus III5Multivariable Calculus3Linear Algebra3Differential Equations4Owing two courses:5Probability5Mechanics5Electricity and Magnetism5Waves and Optics5
III. Other Major Data CHEM 121 CHEM 131 MEGR 210 MEGR 230 MEGR 281 MATH 134 MATH 135 MATH 232 MATH 233 MATH 234 Choose one of the follow MATH 351 PHYS 121 PHYS 123 Elective	epartment Requirements General Chemistry I 4 General Chemistry Lab I 1 Statics 4 Dynamics 4 Engineering Methods 4 Calculus I 5 Calculus III 5 Multivariable Calculus 3 Linear Algebra 3 Differential Equations 4 owing two courses: 5 Probability 5 Mechanics 5 Electricity and Magnetism 5 Waves and Optics 5 (CEEGR 100 recommended) 2

NOTE: Fundamentals of Engineering (FE) examination is required for graduation.

Bachelor of Science in Civil Engineering Major in Civil Engineering with a Specialization in Environmental Engineering

In order to earn the bachelor of science in civil engineering degree with a specialization in environmental engineering, students must complete a minimum of 45 credits in the core curriculum and 192 credits total. A cumulative 2.50 grade point average is required, in addition to a 2.50 average in major/department requirements, including the following:

I. Core Curriculum Requirements

ENGL 110	College Writing: Inquiry and Argument	5
PHIL 110	Introduction to Philosophy and Critical Thinking	5
Choose one of the follo	wing two courses:	5
HIST 120	Origins of Western Civilization	
HIST 121	Studies in Modern Civilization	
ENGL 120	Introduction to Literature	5
PHIL 220	Philosophy of the Human Person	5
Social Science I (not	economics)	5
Social Science II satis	fied by CEEGR 302	
Theology and Religio	us Studies Phase II (200-299)5	5
Ethics (upper division	n)5	5
Theology and Religio	us Studies Phase III (300-399)5	5
iterdisciplinary satisfied within major.		
enior synthesis filled by CEEGR 487, 488, 489.		

Students majoring in civil engineering with an environmental engineering specialty must earn a minimum of 45 credits in the core curriculum. See detailed core curriculum information in this *Bulletin*.

II. Major Requirements

78 credits, including:		
CEEGR 105	Civil Engineering Graphics and Communication	3
CEEGR 221	Mechanics of Materials I	4
CEEGR 222	Mechanics of Materials Lab I	2
CEEGR 302	Engineering Economy	3
CEEGR 311	Engineering Measurements	4
CEEGR 331	Fluid Mechanics	4
CEEGR 335	Applied Hydraulics	5
CEEGR 337	Fluids Lab	. 1
CEEGR 341	Biological Principles for Environmental Engineers	5
CEEGR 342	Environmental Engineering Chemistry	4
CEEGR 351	Engineering Geology	4
CEEGR 353	Soil Mechanics	5
CEEGR 371	Water Resources I	3
CEEGR 473	Principles of Environmental Engineering	5
CEEGR 474	Water Supply and Wastewater Engineering	5
CEEGR 475	Hazardous Waste Engineering	5
CEEGR 487	Engineering Design I	4
CEEGR 488	Engineering Design II	4
CEEGR 489	Engineering Design III	4

Choose one of the follo	owing five courses:
CEEGR 425	Transportation Engineering
CEEGR 455	Foundation Design
CEEGR 472	Water Resources II
CEEGR 476	Environmental Law and Impact Studies
CEEGR 486	Green Engineering
III. Other Major D	epartment Requirements
CHEM 121	General Chemistry I 4
CHEM 131	General Chemistry Lab I 1
MEGR 210	Statics 4
MEGR 230	Dynamics 4
MEGR 281	Engineering Methods 4
MATH 134	Calculus I 5
MATH 135	Calculus II 5
MATH 136	Calculus III
MATH 232	Multivariable Calculus
MATH 233	Linear Algebra 3
MATH 234	Differential Equations
Choose one of the follo	owing two courses:
MATH 244	Probability and Statistics
MATH 351	Probability
PHYS 121	Mechanics
PHYS 122	Electricity and Magnetism
PHYS 123	Waves and Optics5
Choose one of the follo	owing two options:
a. BIOL 101	Principles of Biology
b. BIOL 161	Biology I: Molecular and Cellular Biology
BIOL 171	Biology I Lab
Elective	(CEEGR 100 recommended) 2
NOTE: Fundamentals	of Engineering (FE) examination is required for graduation.

Minor in Environmental Engineering

To earn a minor in environmental engineering, students must complete a minimum of 30 credits in civil and environmental engineering, including:

	5 5 5	
CEEGR 341	Biological Principles for Environmental Engineers	5
CEEGR 342	Environmental Engineering Chemistry	4
CEEGR 351	Engineering Geology	4
CEEGR 473	Principles of Environmental Engineering	5
CEEGR 476	Environmental Law and Impact Studies	4
CEEGR 486	Green Engineering	4
Approved CEEGR c	ourses (300 or higher)	4

Students majoring in civil engineering are not eligible for this minor. See policy for minors (84-1) for more information.

Civil and Environmental Engineering Courses

CEEGR 291-293	Special Topics 1 to 5	
CEEGR 296	Directed Study	l to 5

CEEGR 351Engineering Geology4Mineralogy of rocks; types of rocks, their formation, structure and engineering properties; plate tecton-
ics; structural geology; seismicity; introduction to and use of topographic maps, aerial photographs and
geologic maps in engineering projects. Geotechnical field exploration techniques. Slope stability issues.
Erosional and depositional land forms of rivers and glaciers. Engineering geology in contemporary civil
engineering projects. Four lecture hours per week. (fall)

CEEGR 371Water Resources I3Hydrologic data sources, collection, and analysis, including frequency analysis. Precipitation, runoff, evap-
oration, and transpiration. Analysis of stream flow, hydrographs, flood mitigation, and drainage basins.3Prerequisite: CEEGR 331, Co-requisite or prerequisite: MATH 244 or 351. (spring)

CEEGR 391-393	Special Topics	1 to 5
CEEGR 396	Directed Study	1 to 5

CEEGR 425 Introduction to the fun mand and capacity sup Urban transportation p	Transportation Engineering
CEEGR 445 Classical and matrix m response of structures,	Structural Mechanics
CEEGR 447	Structural Design I
CEEGR 449 Design of structural me Reinforced and prestres	Structural Design II
CEEGR 455 Design considerations f pressure theory. Design anchored retaining stru exploration results. Pres	Foundation Design
CEEGR 472 Streamflow routing pro processes. Subsurface I (fall)	Water Resources II
CEEGR 473 Introduction to water a management through t balance analyses. Four CEEGR 342. (fall)	Principles of Environmental Engineering
CEEGR 474 Physical, chemical, and tures and one laborator	Water Supply and Wastewater Engineering
CEEGR 475 Explores the fate and the programmatic criteria a structor permission. (sp	Hazardous Waste Engineering
CEEGR 476 Social, economic, and e water policies, program plementation. Terminole ing recommended. (wir	Environmental Law and Impact Studies
CEEGR 486 Introduces principles of cuses also on the desig systems for the develop examined. Students are sentation. Pre- or co-ree	Green Engineering 4 f green building including the sustainable use of water, energy and materials. Fo- on of alternative energy production systems including solar, wind and microhydro ping world. Sustainable pollution control technologies for air and water are also required to identify a project that culiminates with a final design report and pre- quisite: CEEGR 342. (spring)

CEEGR 487	Engineering Design I			ŧ.
Design process, proble	m solving and decision ma	aking, project plann	ning and scheduling, team dynamic	5,
résumé writing, netwo	rking and interviewing sk	ills, interaction with	h the professional engineering com	1-
munity, developing tech	nnical writing and oral com	nmunication skills.	Engineering proposal preparation fo	r
senior capstone project	t. Prerequisite: senior stand	ding and departmen	nt permission. (fall)	

CEEGR 488	Engineering Design II 4
CEEGR 489	Engineering Design III 4
Group design project fo	cusing on the integrative aspects of engineering subject matter. The project should
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focus on: (1) philosophy of design, a creative approach, and a comprehensive design project; planning, organizing and leading an engineering project, exercising judgment and considering economic factors; and (2) integrated aspects of creative design and analysis; case studies; design of a novel device or system. Two lecture and four design hours per week. The three-course series fulfills the senior synthesis core requirement. Prerequisite: CEEGR 487 for CEEGR 488; CEEGR 488 for CEEGR 489. (488 winter, 489 spring)

CEEGR 491-493	Special Topics	1 to 5
CEEGR 496	Independent Study	1 to 5
CEEGR 497	Directed Reading	1 to 5
CEEGR 498	Directed Research	1 to 5