



UNIVERSITY
OF
EVANSVILLE

Civic Mission... Sacred Trust

**Civil
Engineering
Program
Guide Book
2009-2010**

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CIVIL ENGINEERING PROGRAM GUIDE BOOK 2009-10

Table of Contents

Civil Engineering at the University of Evansville.....	2
Civil Engineering Degree Program.....	6
Areas of Specialization	11
Co-op and Intern Programs.....	11
Harlaxton College Option.....	13
Honors Program.....	14
Student Organizations.....	15
Degree Requirements	17
Engineering Management Minor	20
Civil Engineering Courses	21
Faculty and Staff	Back Cover

Web Page

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The civil engineering program at the University of Evansville (UE) is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Revised 2009

CIVIL ENGINEERING AT THE UNIVERSITY OF EVANSVILLE

Civil engineering is a people-serving profession, concerned with improving the quality of life. Community, societal, and environmental needs are met through the planning, design, construction, and maintenance of public and private facilities. Civil engineers apply their technical knowledge and skills to diverse projects including stadiums, buildings, dams, highways, bridges, airports, foundations, storm water management systems, and facilities for environmental remediation and compliance. Civil engineering career opportunities exist in industry, government, and the private sector. Practice areas include design, construction, project management, consulting, research, and teaching.

In accordance with the ABET accreditation criteria, the faculty have established objectives and outcomes for students majoring in civil engineering at the University of Evansville. The purpose of these is to ensure that graduates of the program are adequately prepared to enter the practice of civil engineering. Recognizing that the performance of students and graduates is an important consideration in the evaluation of an institution, a system of ongoing assessment is conducted by the faculty to continuously improve the effectiveness of the program.

Civil Engineering Program Educational Objectives and Outcomes

“Graduates” are defined as civil engineering alumni within 3-5 years of graduation.

- Objective 1** Graduates will be actively engaged in a professional career as a civil engineer or pursuing advanced study.
- Objective 2** Graduates will understand professional practice issues and demonstrate a commitment to professional licensure and continuing education.
- Objective 3** Graduates, guided by the principles of sustainable development and global interconnectedness, will understand how civil engineering projects affect society and the environment.

“Students” are defined as civil engineering students at the time of graduation from the University of Evansville.

- Outcome a:** Students will apply knowledge of mathematics and science
- Outcome b:** Students will apply knowledge of the fundamentals of engineering science specific to civil engineering
- Outcome c:** Students will design and conduct laboratory experiments as well as analyze and interpret data

- Outcome d:** Students will complete a civil engineering design to meet desired needs within realistic constraints
- Outcome e:** Students will function on multidisciplinary teams
- Outcome f:** Students will identify and analyze problems and apply knowledge to develop solutions in at least four technical areas appropriate to civil engineering
- Outcome g:** Students will understand professional and ethical responsibilities of civil engineers
- Outcome h:** Students will use effective communication techniques in the completion of engineering projects
- Outcome i:** Students will have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- Outcome j:** Students will have a recognition of the need for and be able to engage in lifelong learning
- Outcome k:** Students will be knowledgeable of contemporary issues
- Outcome l:** Students will use the techniques, skills, and modern engineering tools in use in the civil engineering profession
- Outcome m:** Students will begin the professional registration process by registering for and taking the Fundamentals of Engineering exam

The civil engineering undergraduate program is designed to provide students with a rigorous, thorough understanding of mathematics, basic sciences, humanities, social sciences, and communication skills. The curriculum prepares students to meet present and future challenges in the profession and to develop insights into economical, physical, social, and political constraints affecting the engineering decision-making process. Today's engineers must be adept at working in a global marketplace. To assist engineers in meeting that challenge, the University of Evansville provides students with an opportunity for an international experience at Harlaxton College in Grantham, England.

Students follow a curriculum that provides a well-rounded fundamental understanding of civil engineering concepts in accordance with current practice. This is achieved through a set of required core courses in construction materials, structural engineering, hydraulic engineering, geotechnical engineering, surveying, transportation engineering, and environmental engineering. In addition, the curriculum provides options for students to take upper division elective courses in structural analysis and design, engineering economics, engineering hydrology, environmental engineering, and special topics in civil engineering.

Civil engineers are problem solvers and the engineering curriculum allows students to develop the skills necessary to identify, formulate, and solve engineering problems. Components of professional and ethical responsibility are incorporated in most civil engineering courses to prepare students for professional practice.

Students are introduced to engineering design in the fall of their freshman year in Engineering 101. The small number of freshmen in each section of this course allows for close interaction with a faculty member who is also the students' advisor. Past freshmen projects include the design of balsa wood bridges and paper columns that are load tested in the laboratory.

After students gain an understanding of fundamental concepts, design education is continued during the junior year through a variety of design projects such as a water-powered vehicle in Civil Engineering 366, a building foundation in Civil Engineering 338, and an elevated steel walkway in Civil Engineering 341. Design is heavily emphasized in the Civil Engineering 400 level required and elective courses and is developed through the use of both individual and team projects. Students utilize computer software in the design process.

All civil engineering students are required to take the Fundamentals of Engineering exam. Although passing the exam is not required for graduation, it is the first step toward registration as a professional engineer. During the period 1997-2008, UE civil engineering students exceeded the national passing rate in ten of twelve years.

Year	UE Passing Rate	National Passing Rate
1997	80%	69%
1998	73	72
1999	80	78
2000	85	65
2001	54	76
2002	88	79
2003	89	78
2004	80	76
2005	72	81
2006	83	72
2007	78	76
2008	100	71

The civil engineering curriculum includes a good balance of course work in basic mathematics, science, and engineering topics. The engineering topics are divided into approximately two-thirds engineering science and one-third engineering design. The allocation between analysis and design prepares civil engineering graduates to enter the practice of engineering or further their education in graduate school. Student chapters

of the American Society of Civil Engineers (ASCE), Chi Epsilon (civil engineering honor society), and the Society of Women Engineers (SWE) are sponsored by the department to support and encourage the professional development of the student.

The University of Evansville is an intermediate size, private university with a strong emphasis on undergraduate education. UE is a liberal arts and sciences university. High quality education that emphasizes both the liberal arts and specific professional degree programs, such as engineering, business, education, and nursing, is offered. This emphasis allows engineering students to obtain a quality, well-rounded education. Engineering faculty interact with their colleagues in humanities, fine arts, social sciences, and other professional schools. The University's size of about 2,600 full-time students and its large variety of degree programs with over 80 options gives it a dynamic combination of close, faculty-student interaction and diversity.

The civil engineering curriculum is typical of most EAC-ABET accredited colleges and universities. What differentiates UE's civil engineering program from larger university programs is the following:

- Class sizes are small. This allows for close personal contact between students and professors and for design project opportunities.
- The faculty is dedicated to teaching, which gives the program great flexibility. Course content is kept up-to-date and innovative instruction techniques, such as working on multidisciplinary teams, cooperative learning, and use of current civil engineering design and analysis software, are used in the classroom.
- All civil engineering laboratory equipment is dedicated to serving the undergraduate engineering student. Labs are taught by professors not graduate students.
- Emphasis is placed on preparing students to enter the practice of engineering upon graduation.
- A personalized co-op program, featuring alternative terms of paid, full-time professional employment and university attendance is available.
- The University's size and diversity facilitates the ability of engineering students to interact with students and faculty in other programs, thus allowing free intellectual and social interchange.
- Students are mentored to develop a love of learning and discovery that will motivate them to be lifelong learners.

CIVIL ENGINEERING DEGREE PROGRAM

FIRST YEAR	
Fall	Spring
Calculus I	Calculus II
General Chemistry	Calculus Physics I
Introduction to Engineering	Materials Science
The Ancient World to the Reformation (WC 110)	First-Year Seminar (FYS 120)
Foreign Language 111	Foreign Language 112

During the first year of the civil engineering program, students take two semesters of calculus which cover differentiation and integration with applications of each. Calculus II contains a brief introduction to differential equations. There is one semester of chemistry which assumes that students have had a high school chemistry course as a prerequisite. The first semester of calculus-based physics is taken in the spring of the freshman year; it covers mechanics, thermodynamics, and sound. The required world cultures and first-year seminar courses are taken in the freshman year. World Cultures 110 examines the ancient world and includes studies of Sumerian, Chinese, Greek, Roman, Indian, and Hebrew cultures, as well as the period from the Middle Ages to the Reformation. First-Year Seminar 120 includes a range of global and interdisciplinary topics. Students will encounter challenging texts, perform critical analysis, and engage in expository writing.

The first semester of the freshman year includes the Introduction to Engineering course (Engineering 101). This course meets three times a week and is taught by the students' academic advisor. Students spend the semester designing and building a project in addition to learning team skills, presentation skills, and basic word processing and analytic software. A recent project was the design, construction, and evaluation of a variety of small scale bridges. The bridges were constructed of balsa wood and load tested to failure. Student teams made PowerPoint® presentations to their peers.

In the second semester of the freshman year, civil engineering students take Materials Science. This course begins a study of material behavior which allows students in later courses to study how materials deform or fail under applied loads.

A year of foreign language may be taken in the freshman year for students who come into the program without the equivalent of one year of college level foreign language proficiency. The student with foreign language proficiency may take general education electives in lieu of foreign language.

SECOND YEAR	
Fall	Spring
Calculus III	Differential Equations
Calculus Physics II	Dynamics
Statics	Mechanics of Materials
Surveying	Science Elective
General Education Elective	Electrical Circuits I
Co-op Orientation	General Education Elective
Health and Wellness	

During the first semester of the second year, civil engineering students complete the calculus sequence with Calculus III. This course covers some advanced topics including vectors, multiple integrals, and line and surface integrals. The calculus sequence is followed by a course in differential equations and linear algebra. This course includes standard solution methods, difference equations, numerical techniques, some nonlinear methods, and an introduction to linear algebra. Calculus Physics II is taken in the first semester of the sophomore year and covers electricity, magnetism, optics, and an introduction to nuclear physics. As an alternative, students may elect to take an organic or inorganic physical chemistry course instead of Calculus Physics II.

Sophomore civil engineering students take Statics (rigid body mechanics) during the fall semester. In this course, students learn basic problem-solving strategies to determine forces, moments, and torques required to keep a component or component assembly in equilibrium. Students also obtain their first exposure to trusses typically used in steel structures.

During the fall semester civil engineering students take an introductory course in surveying where they learn to use sophisticated surveying equipment. Students generate planimetric and topographic maps using data collected in the field with total stations and AutoCAD software as a graphics tool.

During the spring semester students take Dynamics. In this course, students study the forces necessary to move and accelerate components. Dynamics introduces a variety of methods, including energy balances, to obtain solutions to problems.

Mechanics of Materials studies how materials deform under applied loads and is a prerequisite for structural engineering courses.

Students take a science elective that is selected from geology, biology, and environmental science courses. The goal of the science elective is to provide students with breadth in their engineering education.

Sophomore civil engineering students spend one semester in a circuits analysis course which includes a structured electronics laboratory.

By the end of the sophomore year students have completed many of the courses that are fundamental to an understanding of engineering design and analysis. They have developed an approach for solving engineering problems and have a basic understanding of how engineering components behave. Just as important, they have begun the process of obtaining the broad education necessary to understand the impact of engineering solutions in a global context.

THIRD YEAR	
Fall	Spring
Engineering Mathematics	Design of Steel Structures
Construction Management	Soil Mechanics and Soil Behavior
Structural Analysis	Environmental Engineering I
Fluid Mechanics	Transportation Engineering
Hydraulics Laboratory	Construction Materials
General Education Elective	Soil Mechanics Laboratory

In the junior year, civil engineering students begin to concentrate in their major. They take required core courses to expand the breadth of their understanding of civil engineering.

Applied Engineering Mathematics introduces students to applied linear algebra and probability and statistics.

Construction Management covers general principles of contracting, planning and schedules, cost estimating, and project economics. Primavera SureTrak[®] project management software is utilized in a significant team project.

Structural Analysis involves the analysis of loaded beams, frames, and trusses for internal forces and displacements. Structural analysis software is introduced and applied. The course prepares students for structural design courses in structural steel and reinforced concrete.

Fluid Mechanics introduces the civil engineering student to the physical properties of fluids, fluid statics, and fluid flow with applications in pipe systems and open channel flow.

The hydraulics laboratory course allows students to study properties of fluids and the application of continuity, energy, and momentum principles by performing numerous laboratory experiments.

During the spring semester, students take a course in the design of steel structures, using AISC and ASCE code requirements. Design projects, such as walkways and auditoriums, are completed by students.

Soil Mechanics and Soil Behavior introduces the student to soils and rocks as civil engineering materials. Concurrently, students take Soil Mechanics Laboratory where tests such as Atterberg Limits, permeability, Proctor compaction, consolidation, and direct shear are performed.

The first course in environmental engineering offers the student an introduction to a variety of topics including global pollution, air pollution, water supply and treatment, groundwater contamination, hazardous and solid waste disposal, risk analysis, and environmental law.

Transportation Engineering involves the design of highways, airports, railways, traffic systems, and mass transit. Students analyze pavement systems and are exposed to transportation planning.

The Construction Materials course covers a variety of materials including steel, concrete, asphalt, and timber. The civil engineering materials lab allows students to gain experience with concrete batch designs and destructive and nondestructive testing.

In the senior year civil engineering students complete the required structural engineering sequence with reinforced concrete design.

FOURTH YEAR	
Fall	Spring
Design of Concrete Structures	Senior Project II
Geotechnical Engineering	Technical or Free Elective
Hydraulic Structures	General Education Elective
Senior Project I	General Education Elective
Technical or Free Elective	Technical or Free Elective
General Education Elective	

Geotechnical Engineering focuses on design applications involving earth retaining structures, foundations, and embankments.

Design of Hydraulic Structures includes an in-depth study of open channel flow and the design and analysis of pipe networks. Students use numerical models such as HEC-RAS and WaterCAD to complete design projects.

The civil engineering senior design sequence provides a multifaceted design problem which involves the coordinated effort of all design team members. This two-semester capstone sequence provides project design experience and explores the professional and ethical issues in engineering. The project design portion of the course is divided into Phases I and II. Phase I includes the selection of the design project and members of the design team, preparation of a written report addressing the problem definition, background information, alternative solutions, a list of tasks required to solve the problem, milestones in the design project, a time schedule to meet the project milestones, and an engineering time and materials cost estimate. Phase I concludes with the submission of a preliminary engineering report and an oral presentation to the project sponsor, peers, faculty, and engineering professionals.

Phase II involves the completion of the design proposed during Phase I, culminating in a written report and oral presentation before peers, the project sponsor, faculty, and engineering professionals.

The ethics portion of the course is seminar-based with outside speakers, class discussion, assigned readings and case studies related to ethics, professional issues, and the affect of civil engineering projects on society.

Recent senior design projects have included the designs of a “green” residential development, a new highway bridge and reinforced earth slope for the U.S. Navy, spillway modifications for an earth dam at an Indiana state park, a seismic resistant Red Cross building, a new Islamic Center, athletics facilities for a local high school, site development for a subdivision, the structural design of a mezzanine used for lab space, and the design of new residential street and traffic facilities in the city of Evansville.

Students complete the last of their general education requirements and select electives in their area of specialization during both semesters of their senior year. During the spring semester, senior civil engineering students take the Fundamentals of Engineering exam as the first step in becoming registered as a professional engineer.

AREAS OF SPECIALIZATION

Technical electives can be taken in several different areas:

- Intermediate Structural Analysis
- Advanced Structural Design
- Engineering Hydrology
- Environmental Engineering II
- Engineering Economics
- Special Topics in Civil Engineering: Earth Dams, Advanced Transportation Engineering, and Construction Scheduling
- Independent Study in Civil Engineering

In addition to this list, students may choose an elective in mechanical engineering.

CO-OP AND INTERN PROGRAMS

Civil engineering majors are encouraged to participate in cooperative education. In the co-op program, a student completes the Bachelor of Science in Civil Engineering (BSCE) degree requirements in five years but at the end of that time the student has a degree plus a minimum of three terms of experience as a civil engineer.

The typical civil engineering co-op student attends classes the first two years as a traditional student. At the end of the sophomore year the co-op student begins summer work with a private company or government agency. The student attends classes in the fall, then returns to work in the spring. Thereafter, the co-op student alternates between work and school.

CO-OP CALENDAR			
Year	Fall	Spring	Summer
1	School 1	School 2	Work option
2	School 3	School 4	Work 1
3	School 5	Work 2	School 6
4	Work 3	School 7	Work 4
5	School 8	School 9	

Students who are exceptionally well prepared to enter the work force may begin their co-op period in the summer after the freshman year. This is unusual and most students begin after the sophomore year.

To enter the co-op program, students enroll in EXED 090. This is a non-credit course which is taken during the fall of the sophomore year. This course covers topics such as résumé writing, interviewing, job

descriptions, and employer expectations. During the spring semester of the sophomore year the typical co-op student interviews with prospective employers. The Office of Career Services and Cooperative Education contacts employers and arranges interviews for students. Actual placement in a co-op position is dependent on the outcome of the interview process.

Internships are available as full-time jobs during the summer, or as part-time jobs during the school year. Co-op students in civil engineering have a wide range of employers to choose from. Employers are located in the immediate Evansville area, in the surrounding region of Indiana, Kentucky, and Illinois, and at various places throughout the country. If a student wants to work for a company that has not been a co-op employer with UE, the Office of Career Services and Cooperative Education will contact that company and attempt to establish a program. To qualify as a legitimate co-op employer, the company has to provide a civil engineering opportunity for a student that is relevant to the student's education and chosen profession. Some of the companies that have provided co-op or intern opportunities for UE civil engineering students are listed below:

ATC	Koester Contracting
Bernardin Lochmueller Associates	McCurric Golf Course
Bowen Engineering Corp.	Construction
Burns and McDonnell Engineering	Morley and Associates Inc.
City of Akron, Ohio	Patriot Engineering
City of Evansville	R.W. Armstrong
City of Indianapolis	Shewmaker Environmental
Davis Heavy Construction	Traylor Brothers
Indiana Department of	U.S. Navy
Transportation	Cives Steel Company

The value of the co-op program is the experience that it provides the student. A co-op job can be a financial benefit, but one term at work does not typically cover the cost of one term in education. The co-op program gives employers an opportunity to look at a student as a prospective employee without making a commitment to long-term employment. Likewise, the co-op program gives the student a chance to examine a company and gain some experience before entering the workforce as a working professional.

Co-op students normally get a higher salary offer upon graduation than non co-op students. In many cases the co-op employer provides a long-term employment opportunity for the co-op student upon graduation. About 20 percent of civil engineering students participate in the co-op program. Internships are available to students who would like to gain actual engineering work experience but still complete their degree in four years.

HARLAXTON COLLEGE OPTION

The University of Evansville's Harlaxton College is located just outside of Grantham, England, in the rolling English countryside. Harlaxton College is about a one hour train ride north of London. Engineering students who choose to spend a semester studying at Harlaxton have easy access to England's culture, history, and entertainment.

Harlaxton College is housed in a large Victorian manor where about 200 students and faculty live and hold classes. The manor has a state dining room and a number of historic state rooms where classes are held. A soccer field, sports hall, student lounges, bistro, and tennis courts are available on the grounds.

Engineering students who wish to study one semester in England are encouraged to do so during the first semester of their sophomore year. At Harlaxton, engineering students typically take calculus, British studies and general education classes. Harlaxton College is on the semester system and all classes earn credit at the University of Evansville in the same way they would if they were taken in Evansville. The engineering program requires five general education courses and it is possible to select classes at Harlaxton College that will count as required courses toward the engineering degree. Tuition at Harlaxton is the same as tuition at the Evansville campus and all scholarships and loans may be applied to Harlaxton costs.

Students at Harlaxton are encouraged to travel on weekends. The college arranges eight to ten weekend field trips to locations such as Stonehenge, Nottingham, London, and Scotland. During some semesters, less frequent but longer trips are arranged to Ireland and the continent.

Harlaxton has its own resident British faculty as well as visiting faculty members from the home campus and other selected campuses in the United States. Likewise, students at Harlaxton come from the Evansville campus and various other campuses around the United States.

It is also possible to attend a five-week summer session at Harlaxton and take Independent Study in Civil Engineering (Civil Engineering 498) and investigate an English design of the Industrial Revolution.

Harlaxton College Costs

While the tuition at Harlaxton College is the same as on the Evansville campus and all scholarships apply to Harlaxton, there are additional costs associated with travel. The typical airplane round trip is \$1,200 and students at Harlaxton College will spend an additional \$3,000-\$4,000 on weekend trips, souvenirs and other miscellaneous expenses. Additional expenses should be less during the summer session.

HONORS PROGRAM – CIVIL ENGINEERING

The Honors Program is open to selected civil engineering majors on entrance to the University. Admittance to the Honors Program is determined by the University Honors Committee on the basis of standardized test scores, an essay and other student work completed in high school. The program provides participants with the opportunity to interact with other Honors Program students both socially and academically. Special honors courses and other academic events are available for honors students both in general education and in the major. Honors students have special library privileges and are able to register early.

In civil engineering, honors students must meet the following requirements:

1. Honors students must have a grade point average of 3.3 or better at the time of graduation.
2. Honors students must acquire a total of at least 21 points in the Honors Program made up of the following:

Course Requirements

Honors Courses (generally three points each) are offered on a regular basis. They include World Cultures 110 and First-Year Seminar 120, various courses which fulfill the general education requirements, honors courses in other departments which are not part of the general education requirements, and honors science labs.

Weekly Discussion Courses (generally one point each) are offered on a variety of topics and include small group discussion of a book, a research topic, or a topic of current interest.

Major Courses (generally three points each) are courses within the major which are given a section designation of H.

Alternate Courses (points vary)

Alternate honors courses include courses taken for independent study and contract courses. A contract course is a non-honors course in which a written contract, which requires additional or alternative course work, is prepared. The contract must be pre-approved by the instructor, the department chair and the honors director.

Honors Project

In civil engineering this requirement is satisfied by the senior project sequence (Civil Engineering 493/497). This is a year-long sequence in which civil engineering students write a proposal during the spring semester of their junior year and complete a comprehensive civil engineering design project. The honors project in civil engineering is typically more challenging, has a significant design component, and is presented at a regional or national conference.

Study Abroad

Study at Harlaxton College during the fall or spring semester earns two points. Completion of a summer semester earns one point.

3. Students must participate in the Honors Program each semester.

STUDENT ORGANIZATIONS

ASCE Student Chapter

The American Society of Civil Engineers is the oldest national engineering society in the United States. The mission of ASCE is to enhance the quality of life worldwide by advancing professional knowledge and improving the practice of civil engineering in service to humanity. Founded in 1852, ASCE has more than 120,000 members, including over 15,000 student members.

ASCE sponsors specialty conferences and continuing education courses, provides the government with technical assistance on civil engineering related issues, conducts an active public awareness program and is the largest publisher of civil engineering information in the world. Within the society, there are over 500 technical and management committees working to advance the theory and practice of the profession.

Individual UE students as well as the local chapter have been recognized for accomplishments and achievements. Several seniors have received awards in Zone II for the national Daniel W. Mead Ethics Essay competition. In 2003 and 2008 the student chapter hosted the Great Lakes Regional Conference, with schools such as the University of Wisconsin, Rose-Hulman, Bradley, Purdue, and University of Illinois at Urbana-Champaign attending. In 2005 the chapter was awarded a Certificate of Commendation for all their activities, one of only 25 schools out of the 200 civil engineering schools in the country to be so recognized. In 2005, 2006, and 2009, the UE concrete canoe team participated in the National Concrete Canoe Competition.

The local student chapter participates in a variety of social and technical activities.

- Student chapter meetings
- Construction and industrial tours
- Joint meetings with the local ASCE parent branch
- Attend and participate in regional and national ASCE meetings
- Network with guest speakers from business and industry
- Gain leadership skills as an officer in the student chapter
- Scholarship opportunities through ASCE
- Participate in the senior presentation competition at the Indiana section meeting in Indianapolis

- Sponsor the regional balsa wood bridge competition
- Concrete canoe competition
- Steel bridge competition

Chi Epsilon

On January 15, 2005, the 128th chapter of Chi Epsilon was installed at the University of Evansville. Chi Epsilon is the national civil engineering honor society. It is dedicated to recognizing civil engineering students with high scholastic ability, moral integrity and social poise. Eligibility is limited to juniors and seniors who rank in the upper one-third of their class.

SWE

The Society of Women Engineers is a national organization with student sections on each engineering campus. The section is an interdisciplinary organization with membership cutting across all the engineering disciplines and is also open to men who are interested in the mission and activities of the group.

The mission of SWE is to encourage women to achieve their full potential in careers as engineers and leaders, to expand the image of the engineering profession as a positive force in improving the quality of life, and to demonstrate the value of diversity.

DEGREE REQUIREMENTS – BSCE

The Bachelor of Science in Civil Engineering requires at least 126 hours, distributed as follows:

General Education (40 hours)

World Cultures 110 and First-Year Seminar 120 (6 hours); General education electives: American Traditions (3 hours), International Perspectives (3 hours), Creative Dimension (3 hours), Philosophical/Spiritual Dimension (3 hours), Human Behavior and Society (3 hours), and Health and Wellness (1 hour); Mathematics 221 (4 hours); Chemistry 118 and Physics 210 (8 hours). In addition, the University proficiency requirements in a foreign language and writing in English must be met (see University degree requirements). The senior seminar requirement will be fulfilled by Civil Engineering 493 and Civil Engineering 497 (6 hours).

Note: Mathematics 211 may be taken in place of Mathematics 221.

Lower Division Required Courses (39 hours)

Mathematics 222, 323, 324; Physics 211; Engineering 101; Electrical Engineering 210; Civil Engineering 183, 212, 213, 230, 232; one from Biology 100, 107, 110, 112, 201, Environmental Studies 103, 360, Geology 130.

Note: Chemistry 240 or 280 may be substituted for Physics 211 with advisor's approval.

Upper Level Required Courses (38 hours)

Engineering 390; Civil Engineering 324, 331, 338, 339, 340, 341, 342, 350, 366, 374, 380, 438, 469.

Electives (9 hours)

Two of Civil Engineering 443, 449, 468, 475, 498, 499; Engineering 409; or Mechanical Engineering 432, 434, 446, 448, 463, 466 (6 hours); 3 hours free elective.

Note: Courses numbered MATH 212 or lower, CHEM 10x, or PHYS 1xx, software application courses, WRTG 101, 102, may not be used as free electives.

Bachelor of Science in Civil Engineering

FALL		FRESHMAN		SPRING	
CHEM 118	Principles of Chemistry	4	CE 230	Materials Science	3
ENGR 101	Introduction to Engineering	3	FYS 120	First-Year Seminar	3
			MATH 222	Calculus II	4
MATH 221	Calculus I	4	PHYS 210	Calculus Physics I	4
WC 110	The Ancient World to the Reformation	3		Foreign Language 112*	3
	Foreign Language 111*	3			17
		17			
SOPHOMORE					
CE 183	Surveying	3	CE 213	Dynamics	3
CE 212	Statics	3	CE 232	Mechanics of Materials	3
EXED 090	Building Your Professional Image	0	EE 210	Circuits	3
			MATH 324	Differential Equations	3
EXSS 111	Concept of Human Performance	1		General Education	3
MATH 323	Calculus III	4		Science Elective	3
PHYS 211	Calculus Physics II	4			18
	General Education	3			
		18			
JUNIOR					
CE 324	Construction Management	3	CE 331	Construction Materials	3
CE 340	Structural Analysis	3	CE 338	Soil Mechanics and Soil Behavior	3
CE 366	Fluid Mechanics	3	CE 339	Soil Mechanics Lab	1
CE 380	Hydraulics Lab	1	CE 341	Design of Steel Structures	3
ENGR 390	Applied Engineering Mathematics	3		CE 350	Transportation Engineering
	General Education	3		CE 374	Environmental Engineering I
		16			3
					16
SENIOR					
CE 342	Design of Concrete Structures	3	CE 497	Design Project II	4
CE 438	Geotechnical Engineering	3		Free Elective	3
CE 469	Design of Hydraulic Structures	3		General Education	3
				Technical Elective	3
CE 493	Design Project I	2			13
	General Education	3			
	Technical Elective	3			
		17			

*Note: Only if necessary to meet University foreign language requirement.

Harlaxton College Option Plan of Study

	FALL		SPRING		
FRESHMAN					
CHEM 118	Principles of Chemistry	4	CE 212	Statics	3
ENGR 101	Introduction to Engineering	3	FYS 120	First-Year Seminar	3
MATH 221	Calculus I	4	MATH 222	Calculus II	4
WC 110	The Ancient World to the Reformation	3	PHYS 210	Calculus Physics I	4
	Foreign Language 111*	3		Foreign Language 112*	3
		<u>3</u>			<u>17</u>
		17			

SOPHOMORE					
ID H282/283	The British Experience	6	CE 213	Dynamics	3
MATH 323	Calculus III	4	CE 230	Materials Science	3
	General Education	6	CE 232	Mechanics of Materials	3
		<u>16</u>	MATH 324	Differential Equations	3
				General Education	3
				Science Elective	3
					<u>18</u>

JUNIOR					
CE 183	Surveying	3	CE 331	Construction Materials	3
CE 324	Construction Management	3	CE 338	Soil Mechanics and Soil Behavior	3
CE 340	Structural Analysis	3	CE 339	Soil Mechanics Lab	1
CE 366	Fluid Mechanics	3	CE 341	Design of Steel Structures	3
CE 380	Hydraulics Lab	1	CE 350	Transportation Engineering	3
PHYS 211	Calculus Physics II	4	CE 374	Environmental Engineering I	3
		<u>17</u>			<u>16</u>

SENIOR					
CE 342	Design of Concrete Structures	3	CE 497	Design Project II	4
CE 438	Geotechnical Engineering	3	EE 210	Circuits	3
CE 469	Design of Hydraulic Structures	3	EXSS 111	Concept of Human Performance	1
CE 493	Design Project I	2		Free Elective	3
ENGR 390	Applied Engineering Mathematics	3		Technical Electives	<u>3</u>
	Technical Elective	<u>3</u>			<u>14</u>
		17			

*Note: Only if necessary based on proficiency tests.

Engineering Management Minor

A minor in engineering management is offered by the College of Engineering and Computer Science in cooperation with the Schroeder Family School of Business Administration. For civil engineering students, the engineering management minor can be earned by taking the following courses.

Engineering Management Minor (18 hours)

ECON 101 Principles of Macroeconomics (General Education Elective)

or

ECON 102 Principles of Microeconomics

ENGR 390 Applied Engineering Mathematics (Required)

ENGR 409 Engineering Economy and Decision Making (Technical Elective)

ID 150 The American Corporation (General Education Elective)

MGT 300 Principles of Management (Free Elective)

or

MGT 377 Organizational Behavior

MGT 310 Production/Operations Management (Additional Course)

With careful curriculum planning, civil engineering students can earn an engineering management minor by taking just one additional course.

COURSES

Visit our Web site at mece.evansville.edu/civil/courses.asp for course descriptions.

CE 183 Surveying

CE 212 Statics

CE 213 Dynamics

CE 230 Materials Science

CE 232 Mechanics of Materials

CE 324 Construction Management

CE 331 Construction Materials

CE 338 Soil Mechanics and Soil Behavior

CE 339 Soil Mechanics Laboratory

CE 340 Structural Analysis

CE 341 Design of Steel Structures

CE 342 Design of Concrete Structures

CE 350 Transportation Engineering

CE 366 Fluid Mechanics

CE 374 Environmental Engineering I

CE 380 Hydraulics Laboratory

CE 438 Geotechnical Engineering

CE 443 Intermediate Structural Analysis

CE 449 Advanced Structural Design

CE 468 Engineering Hydrology

CE 469 Design of Hydraulic Structures

CE 475 Environmental Engineering II

CE 493 Civil Engineering Design Project I

CE 497 Civil Engineering Design Project II

CE 498 Independent Study in Civil Engineering

CE 499 Special Topics in Civil Engineering

ENGR 101 Introduction to Engineering

ENGR 390 Applied Engineering Mathematics

ENGR 409 Engineering Economy and Decision Making

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