Note: Electives in junior and senior years must be selected to complete requirements of non-technical electives (21 hrs.), technical electives (six hrs.), engineering science electives (six hrs.), and advanced science electives (seven hrs.). All electives must be selected from a list approved by the Department of Chemical Engineering. A 2.0 GPA in required chemical engineering courses is necessary before registering for CHE 310, 311, 320, 435, 450, or 455.

Department of Civil and Environmental Engineering

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Degree Offered

Bachelor of Science in Civil Engineering

Curriculum in Civil and Environmental Engineering

Civil engineering historically encompassed all engineering endeavors not associated with military activities. Because of its origin and history, civil engineering still embraces a wide variety of technological areas. These include environmental engineering, hydro-technical engineering, geotechnical engineering, transportation engineering, and structural engineering.

Civil engineers work with problems that directly impact the health and economic vitality of people and communities. These problems include waste disposal, environmental pollution, transportation systems analysis and design, water resource development, and the design, construction, and rehabilitation of constructed facilities such as dams, bridges, buildings, and highways. Thus, the challenges and opportunities for a civil engineer lie in combining technical competence with a human concern for the applications of technology. To help students to understand their role in the community, to be effective in working with design teams involving other engineers and other professionals, and to be effective in written and spoken communications, the curriculum attempts to give a meaningful educational experience in the humanities, social studies, English, and economics.

The goal of the undergraduate curriculum in civil and environmental engineering is to prepare graduate civil engineers to meet the present and the future infrastructure and environmental needs of society. This requires an education based on scientific and engineering fundamentals as well as one that incorporates experience in engineering design using modern technology. Because the systems they design impact the public directly, civil engineers must be aware of the social and environmental consequences of their designs. Graduates must be prepared to work and communicate with other professionals in a variety of associations and organizations. Ethics and life-long learning are essential components in the education of civil engineers. During the course of study, civil engineering students are given a solid grounding in mathematics, physics, and chemistry. Added to this is extensive development of the fundamentals of materials science, environmental, soils, hydro-technical, structural, and transportation systems engineering. This broad base of knowledge is provided to insure that civil engineers are educated in all branches of the profession and to permit continuous learning throughout a professional lifetime. Throughout the program, each student works with an academic advisor in the selection of electives. Specialization in one or more of the branches of civil engineering is possible by selection of a sequence of technical electives during the junior and senior years.

Following are the program educational objectives for graduates:

- Have a strong understanding of basic engineering principles. This includes a sound knowledge of the fundamentals of mathematics, computing, basic science, engineering science, and economics.
- Have a strong understanding of the fundamental principles, scope, and techniques of the major areas of civil engineering.
- Have an appreciation for the relationship of the civil engineering profession to society, industry, government, and the environment, as well as for the basic concepts of professionalism and ethics.

- Have the ability to compete for positions in civil engineering, to achieve professional registration, and to engage in life-long learning.
- Have the ability to work productively in teams developing solutions to engineering problems employing creative thinking, analysis, design, evaluation, and communications.
- Have the ability to communicate at a professional level using oral and written prose and engineering graphics.

To be eligible for graduation in civil engineering, a student must attain a GPA of 2.0 or better for all civil engineering courses attempted, except for those courses in which a grade of W or WU was received. If a course is repeated, only the last grade received is counted in computing the GPA, and the course credit hours are counted only once. This requirement assures that the student has demonstrated overall competence in the chosen major.

To complete the B.S. degree program in four years, a student must take approximately 15 to 17 credit hours per semester.

A typical B.S. degree program, which completes degree requirements in four years, is as follows.

Undergraduate Student Minimum Performance Policy

All civil and environmental engineering students matriculating at WVU, including transfer students and second-degree students, must complete each tracking course with a grade of C or better, with the exception that one D among them is permitted. Tracking courses are identified as: Math 155, 156, 251, and 261; Chemistry 115; Physics 111; and MAE 241, 242, and 243. Any tracking course transferred from outside of WVU must be a C or better.

All tracking courses must be completed collectively before taking any 300-level or higher civil engineering course. However, as an exception to the collective prerequisite requirement, environmental engineering (CE 347) and transportation engineering (CE 332) may be taken before completing all tracking courses.

Second-degree students may petition for a waiver to the collective prerequisite requirement for 300-level or higher civil engineering courses, but must meet individual course prerequisites. The petition must include a plan for completing the tracking courses and be approved by the student's academic advisor and the department chairman. When a course is repeated, the last grade earned in that course will be used for determining compliance with this minimum performance policy.

Civil and Environmental Engineering

First year
Common first year as listed on the *middle* of page 102.

Second Year

First Semester	Hrs.
MAE 241 *Statics*	3
MATH 251 *Calculus*	4
CE 210 CAD	2
CE 201 *Introduction to CE*	1
ENGL 102 *Comp. and Rhetoric*	3
PHYS 112/CHEM 116/ BIOL 115	4
Total	**17**

Second Semester	Hrs.
MAE 243 *Mechanics of Materials*	3
MAE 242 *Dynamics*	3
GEC Elective*	3
MATH 261 *Differential Equations*	4
CE Core Class CE 332 or CE 347	4
Total	**17**

Third Year

First Semester	Hrs.
CE 321 *Fluid Mechanics*	3
CE Core Class**	4
STAT 215 *Statistics*	3
ECON 201 *Prin. of Microeconomics*	3
IENG 377 *Eng. Economics*	3
Total	**16**

Second Semester	Hrs.
CE Core Class**	4
CE Core Class**	4
CE 301 *Eng. Professional Dev.*	1
GEC Elective*	3
CE Design Elective†	3
ENGL 305 *Sci. and Tech. Writing*	3
Total	**18**

Fourth Year

First Semester	Hrs.
CE Design Elective†	3
CE Open Elective††	3
CE Open Elective††	3
ENGR/MATH/Science Elective	3
Science Elective*	3
Total	**15**

Second Semester	Hrs.
CE Open Elective††	3
CE 479 *Integrated Design*	3
GEC Elective*	3
ENGR/MATH/Science/ Elective	3
Eng. Elective (outside CEE Dept.)	3
Total	**15**
Grand Total	**132**

* GEC elective and the science elective may be taken in assignment shown or swapped.
** CE core classes are: CE 332 *Introduction to Transportation Engineering*; CE 347 *Environmental Engineering*; CE 351 *Introductory Soil Mechanics*; CE 361 *Structural Analysis I*
† CE Design Electives—Any approved CE 400 level design course—see adviser for approved list
†† CE Open Electives—Any approved CE 300 or CE 400 level course—see advisor for approved list.

Curriculum for a Dual Major in Civil and Mining Engineering

Students can simultaneously pursue B.S. degrees in civil engineering and mining engineering by completing additional courses. The dual degree program requires satisfactory completion of 158 credit hours. A suggested schedule for the dual curriculum in civil engineering and mining engineering is shown below.

Civil Engineering/Mining Engineering (Dual)

First Year
Common first year as listed on the *middle* of page 102.

Second Year

Fall Semester	Hrs.
CE 201 *Introduction to CE*	1
MAE 241 *Statics*	3
MATH 251 *Multivariate Calculus*	4
MINE 201 *Mine Surveying*	3
MINE 205 *Undergrd. Mining Syst.*	3
MINE 261 *Engineering CAD*	2
Total	**16**

Spring Semester	Hrs.
ENGL 102 *Comp. and Rhetoric*	3
MAE 242 *Dynamics*	3
MATH 261 *Elem. Differential Equat.*	4
MINE 206 *Surface Mining Systems*	4
PHYS 112 *General Physics*	4
Total	**18**

Third Year

Fall Semester	Hrs.
CE 321 *Fluid Mechanics*	3
GEOL 342 *Structural Geology*	3
MAE 243 *Mechanics of Materials*	3
MAE 320 *Thermodynamics*	3
STAT 215 *Statistics*	3
Total	**15**

Spring Semester	Hrs.
CE Core*	4
CE Core*	4
MINE 331 *Mine Ventilation*	3
MINE 427 *Coal Preparation*	4
MINE 480 *Interdis. Team Project*	1
Total	**16**

Fourth Year

Fall Semester	Hrs.
CE Core*	4
CE Core*	4
MINE 306 *Mining Explor. & Eval.*	3
MINE 382 *Mine Power System*	3
Total	**14**

Spring Semester	Hrs.
CE *Seminar*	1
CE *Design Elective*†	3
CE *Design Elective*†	3
CE 322 *Hydrotechnical Eng.*	3
GEC Elective	3
IENG 377 *Engineering Economy*	3
Total	**16**

Fifth Year

Fall Semester	Hrs.	Spring Semester	Hrs.
GEC Elective	3	CE *Technical Elective*††	3
GEC: ECON 201 *Prin. of Microec.*	3	CE 479 *Integrated Design*	3
MINE 411 *Rock Mech. & Grd Cont.*	4	GEC Elective	3
MINE 471 *Mine & Safety Mgmt*	3	GEC Elective	3
MINE 483 *Mine Dsgn-Exploration*	2	MINE 484 *Mine Dsgn-Rpt.* (W)	4
Total	**15**	**Total**	**16**

Total Credit Hours for the BS CE and MINE double major program: 158

Notes:

1. Discipline substitutions are:
   a. MINE 306 fulfills requirement of CE Engr/Math/Sci Elective 1.
   b. MINE 411 fulfills requirement of CE Engr/Math/Sci Elective 2.
   c. MINE requirement for AGRN 455 is fulfilled through CE 322 and CE 351.
   d. MINE 382 fulfills requirement of CE Engineering Elective outside CE.
   e. MINE 461 is fulfilled by CE 322.
   f. MINE 484W fulfills CE requirement of ENGL 305.
   g. MINE requirement for STAT 211 is fulfilled by CE requirement of STAT 215.
   h. CE 321 fulfills MINE requirement for MAE 331.
   i. MINE Technical Elective and MINE Eng/Sci Technical Elective requirements are fulfilled by any two of the following; CE 332, 347 or 361.
   j. GEOL 342 fulfills requirement of CE Basic Science Elective.
   k. MINE 261 substitutes for CE 210.
2. *CE Core Classes are: CE 332 *Introduction to Transportation Engineering*; CE 347 *Environmental Engineering*; CE 351 *Introductory Soil Mechanics*; CE 361 *Structural Analysis I.*
   † CE Design Electives—Any approved CE 400 level design course—see adviser for approved list.
   †† CE Open Electives—Any approved CE 300 or CE 400 level course—see advisorfor approved list.
3. For the most recent list of approved courses in the GEC Program, visit the GEC site at WVU Admissions and Records, http://www.arc.wvu.edu/.

Lane Department of Computer Science and Electrical Engineering

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Degrees Offered

Bachelor of Science in Biometric Systems
Bachelor of Science in Computer Engineering
Bachelor of Science in Computer Science
Bachelor of Science in Electrical Engineering

The department offers undergraduate degrees in computer science, computer engineering, and electrical engineering. It also houses the biometric systems major of the University-level bachelor of science in forensic identification.

Curriculum in Biometric Systems

Bachelor of Science in Biometric Systems

Biometric systems are composed of complex hardware and software designed to measure a signature of the human body, compare the signature to a database, and render a decision for a given application based on the identification achieved from this matching process. Uses of biometric systems for positive personal identification are experiencing rapid growth in such areas as law enforcement, access control, banking, and a wide range of business and administrative systems. In an even broader application context, biometric systems are having a revolutionary impact on health care and the enhancement of the