

Civil Engineering

What does a Civil Engineer do?

Civil engineers design, construct, manage and improve the built environment that is all around us. They are involved in all aspects of what makes a city work: the roads, the public transit systems, the freight transit systems, the buildings, the drinking water system, and the waste water/storm water system. They naturally get involved with city or organization planning.

Civil Engineering is often divided into five major sub-disciplines:

1. **Structural Engineering:** Structural Engineering may be what comes to your mind when you think of Civil Engineering. This is the design and analysis of buildings, bridges, roads, space platforms, amusement park rides and many other structures. These structures must be designed to support their own weight plus the weight of any loads that they experience in use.
2. **Environmental Engineering and Water Resources:** Civil Engineers are involved in all aspects of the water that we use every day. They plan water sheds to collect water, storage systems, drinking water treatment systems and the pumps and pipes to deliver water to our houses and businesses. They are also involved with handling and treating the wastewater we create.
3. **Geotechnical Engineering:** Geotechnical engineers focus on how our built environment interacts with the natural environment. This includes the analysis of soils, design of foundations, consideration of wind and storm loads on buildings, and possible earthquake impacts.
4. **Transportation and Highway Engineering:** Transportation engineers are involved with the planning, operation and maintenance of transportation facilities including roads, airports, railroads, and ports. Before a detailed road structure can be designed, an engineer must determine the exact route the road will take, how many lanes are needed, how this road interfaces with other roads, and how the flow of traffic will be maintained. In addition, civil engineers can be involved in the overall planning of the urban environment.
5. **Construction Management:** Making all of these plans a reality requires the planning and management of the construction effort. This requires an understanding of the structure being built, construction techniques, management and financial issues.

Job Outlook: The employment outlook for Civil Engineering is very stable. The Occupational Outlook handbook of the US Bureau of Labor Statistics states “Employment of civil engineers is projected to grow 20 percent from 2012 to 2022, ...”

According to the National Association of Colleges and Employers, the average starting offer nationally to civil engineering graduates in 2020 was over \$65,000.

Civil Engineering Curriculum: In addition to the common first-year engineering curriculum, the Civil Engineering program includes courses in mathematics (e.g., Differential Equations, Linear Algebra), basic engineering (Statics, Dynamics, Strengths of Materials), materials of construction, surveying, structural analysis and design, geotechnical engineering, and environmental engineering, transportation and construction management.

Related Majors at PFW: Mechanical Engineering, Civil & Construction Engineering Technology

PFW Engineering Majors: PFW currently has four undergraduate engineering majors: Civil, Computer, Electrical and Mechanical Engineering. PFW also has a range of engineering technology programs.

The civil engineering majors at PFW culminate with a senior design project. These projects are completed by small groups under the supervision of a faculty advisor. Projects are often sponsored by local industry.

Common First-Year Engineering Curriculum: All engineering majors have the following common first year curriculum for students who are ready to begin Calculus.

| First Semester | | | Second Semester | | |
|----------------|----------------------------------|---------|-----------------|-----------------------------------|---------|
| Course # | Course Title | Credits | Course # | Course Title | Credits |
| MA 165 | Analytic Geometry and Calculus I | 4 | MA 166 | Analytic Geometry and Calculus II | 4 |
| CHM 115 | General Chemistry I | 4 | PHYS 152 | Mechanics | 5 |
| ENGR 127 | Engineering Fundamentals I | 4 | ENGR 128 | Engineering Fundamentals I | 4 |
| ENG W131 | Elementary Composition | 3 | COM 114 | Fundamentals of Speech | 3 |
| | Total | 15 | | Total | 16 |

The standard engineering program begins with MA 165: Analytic Geometry and Calculus I. Students who need to complete other mathematics courses before they will be ready for calculus can pursue an engineering major at PFW. However, it will take them more than four years to complete an engineering degree.

High School Preparation: The ideal preparation for any of the engineering majors includes four years of high school mathematics, one year of physics, one year of chemistry and four years of English. Students should reach the level of mathematics so that they are “calculus ready” (i.e. have sufficient algebra, geometry and trigonometry that they will be ready to begin calculus their first semester.)

For additional information: see the Civil Engineering Department’s website at: <https://www.pfw.edu/departments/etcs/depts/cme/undergraduate/civil.html>