

# Civil Engineering at IPFW

## 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 community 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 – 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 piping systems that 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, and consideration of wind and storm loads on buildings as well as 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 Indiana Department of Workforce Development predicts that there will be a statewide growth in civil engineering employment of 14% between 2000 and 2010.

According to the National Association of Colleges and Employers, the average starting offer nationally to civil engineering graduates in 2007 was \$48,998.

**Civil Engineering Curriculum:** In addition to the common first year engineering curriculum, the civil engineering program includes courses in mathematics (e.g., differential equations and linear algebra), basic engineering (e.g., statics, dynamics, strength of materials), construction materials, surveying, structural analysis and design, geotechnical, and environmental engineering, and transportation and construction management.

**Related Majors at IPFW:** Mechanical Engineering, Civil & Construction Engineering Technology

## Engineering Curriculum at IPFW

**Engineering Majors:** IPFW currently has four undergraduate engineering majors: civil, computer, electrical, and mechanical engineering. IPFW also has a range of engineering technology and computer science programs.

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

**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 101	Introduction to Engineering	1	ENGR 199	Introduction to Engineering Design	3
ENGR 120	Graphical Communications and Spatial Analysis	2	COM 114	Fundamentals of Speech	3
ENGR 121	Computer Tools for Engineers	2			
ENG W131	Elementary Composition	3			
	Total	16		Total	15

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 IPFW. However, it will take them more than four years to complete an engineering degree.

**Engineering Coursework:** After completion of the common first-year curriculum, students take courses according to their selected majors. Students take both lecture and laboratory courses. The curriculum is structured to emphasize problem solving and design, as well as computers, communication, and teamwork.

All engineering majors at IPFW culminate with a one-year senior design project. These projects are completed by small groups under the supervision of a faculty advisor and require students to design, build and test a complete system. Projects are often sponsored by local industry.

**For additional information:** see the engineering department’s website at [www.engr.ipfw.edu](http://www.engr.ipfw.edu). You may also want to visit the Sloan Career Cornerstone Center at [www.careercornerstone.org](http://www.careercornerstone.org) for additional information on engineering careers.