

# Electrical Engineering at IPFW



## What does an Electrical Engineer do?

Electrical engineers design, develop, and operate systems that generate and use electrical signals and power. The scope of electrical engineering has expanded tremendously in recent years. It is now the largest branch in engineering, with most graduates employed by manufacturers of electrical and electronic equipment, aircraft, business machines, and professional and scientific equipment.

Key areas of electrical engineering include:

1. **Communications and Signal Processing:** Electrical engineers design all aspects of communication systems such as the cell phone network. In addition they work on the conversion of a large range of signals into more usable forms for storage, transmission and evaluation. This area includes the processing of medical images (e.g., MRI scans), the analysis of communication signals, and the compression of video.
2. **Solid State Devices:** Electrical engineers are concerned with the analysis, design and fabrication of a range of semiconductor devices from individual transistors through complex integrated circuits.
3. **Power Electronics:** Control of both the nationwide electrical grid that powers all our homes, and the power in an individual electrical device such as a cell phone or computer is a key area for Electrical Engineers
4. **Electro-Magnetics:** Electrical engineers contribute to the understanding and use of the waves that are transmitted and received by communication systems and wireless devices.
5. **Control/Robotics:** Electrical engineers design the circuits and approaches used to control a wide range of the devices that we use at home and at work from the simple cruise control on your car to the control of surgical robots.
6. **Digital Systems (Computers):** Electrical engineers design the hardware that is necessary for any computer system.

**Job Outlook:** Electrical engineering employment will see modest continued growth according to Occupational Outlook Handbook. It notes that “Job growth is expected because of electrical and electronics engineers’ versatility in developing and applying emerging technologies.”

Electrical engineering jobs are expected to hold steady in Indiana. According to the National Association of Colleges and Employers, nationally the average offer to electrical engineering graduates in 2012 was over \$60,000.

**Electrical Engineering Curriculum:** In addition to the common first-year engineering curriculum, the Electrical Engineering program includes courses in mathematics (e.g., Differential Equations, Linear Algebra), circuit design and analysis, digital electronics, robotics, electro-magnetics and signal processing.

**Related Majors at IPFW:** Computer Engineering, Electrical Engineering Technology

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

All engineering majors at IPFW culminate with a senior design project. These projects are completed by small groups under the supervision of a faculty advisor and generally require students to design, build and test a complete system. 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 IPFW. 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 Engineering Department’s website at [www.engr.ipfw.edu](http://www.engr.ipfw.edu). Other helpful websites on engineering careers include:

- Engineering Go For It: [www.egfi-k12.org](http://www.egfi-k12.org)
- Engineer your Life (for girls interested in engineering): [www.engineeryourlife.org](http://www.engineeryourlife.org)
- Sloan Career Cornerstone Center: [www.careercornerstone.org](http://www.careercornerstone.org)