



Mechanical Engineers

SOC Code 17-2141 • Projected Growth (2020)

Description

What Mechanical Engineers Do

Mechanical engineering is one of the broadest engineering disciplines. Mechanical engineers research, design, develop, build, and test mechanical devices, including tools, engines, and machines.

Duties

- Analyze problems to see how a mechanical device might help solve the problem
- Design or redesign mechanical devices, creating blueprints so the device can be built
- Develop a prototype of the device and test the prototype
- Analyze the test results and change the design as needed
- Oversee the manufacturing process for the device

Mechanical engineers use many types of tools, engines, and machines. Examples include the following:

- Power-producing machines such as electric generators, internal combustion engines, and steam and gas turbines
- Power-using machines, such as refrigeration and air-conditioning
- Industrial production equipment, including robots used in manufacturing
- Other machines inside buildings, such as elevators and escalators
- Machine tools and tools for other engineers
- Material-handling systems, such as conveyor systems and automated transfer stations

Like other engineers, mechanical engineers use computers extensively. Computers help mechanical engineers to do the following:

- Produce and analyze designs
- Simulate and test how a machine is likely to work
- Generate specifications for parts
- Monitor the quality of products
- Control manufacturing and production

Training Opportunities Linked to Those Jobs

(Degree Types and Colleges/Universities)

How to Become a Mechanical Engineer

Mechanical engineers need a bachelor's degree. A graduate degree is typically needed to be hired or promoted into managerial positions. Mechanical engineers who sell services publicly must be licensed in all states and the District of Columbia.

Education and Training

Nearly all entry-level mechanical engineering jobs require a bachelor's degree in mechanical engineering.

Mechanical engineering degree programs usually include courses in mathematics and life and physical sciences, as well as engineering and design courses. The programs typically last 4 years, but many students take between 4 and 5 years to earn a degree. A mechanical engineering degree program may emphasize internships and co-ops to prepare students for work in industry. Theory is often another main focus, in order to prepare students for graduate-level work.

A few engineering schools allow students who spend 3 years in a liberal arts college studying pre-engineering subjects and 2 years in an engineering school studying core subjects to receive a bachelor's degree from each school.

Some colleges and universities offer 5-year programs that allow students to obtain both a bachelor's and a master's degree. Some 5- or even 6-year cooperative plans combine classroom study with practical work, enabling students to gain valuable experience and earn money to finance part of their education.

Many engineering programs are accredited by [ABET](#) (formerly the Accreditation Board for Engineering and Technology). Some employers prefer students from an accredited program. A degree from an ABET accredited program is usually necessary to become a licensed professional engineer.

Licenses

All 50 states and the District of Columbia require licensure for engineers who offer their services directly to the public. Licensed mechanical engineers are designated as professional engineers (PEs). The PE license generally requires a degree from an engineering program accredited by ABET, Inc., 4 years of relevant work experience, and passing a state exam.

Recent graduates can start the licensing process by taking the exam in two stages. They can take the Fundamentals of Engineering (FE) exam right after graduation. Engineers who pass this exam commonly are called engineers in training (EITs) or engineer interns (EIs). After gaining experience, EITs can take a second exam, called the Principles and Practice of Engineering exam, for full licensure as a PE.

Several states require continuing education to renew the license every year. Most states recognize licensure from other states, as long as the way that the initial license was obtained meets or exceeds the recognizing state's own licensure requirements.

Certification

Professional organizations, such as the [American Society of Mechanical Engineers](#), offer a variety of certification programs for engineers to demonstrate competency in specific fields of mechanical engineering.

Advancement

Graduate training is essential for engineering faculty positions in higher education, as well as for some research-and-development programs. Many experienced mechanical engineers get graduate degrees in engineering or business administration to learn new technology and broaden their education. Many become administrators or managers after obtaining a graduate degree.

Important Qualities

Creativity. Because mechanical engineers convert scientific concepts into real-world applications, they design and build sometimes complex or unique pieces of equipment and machinery. A creative mind is essential for this kind of work.

Listening skills. Mechanical engineers often work on projects with other engineers and professionals, such as architects. They must listen to and analyze different approaches to the task at hand.

Math skills. Mechanical engineers use the principals of calculus, trigonometry, and other advanced topics in mathematics for analysis, design, and troubleshooting in their work.

Mechanical skills. A background in mechanics, such as experience gained through a co-op in college or work as a mechanic, helps mechanical engineers develop skills that are useful in solving real-world problems. Such a background allows engineers to visualize basic engineering concepts and mechanical processes more easily. Also important is an ability to learn and use new tools and equipment.

Problem-solving skills. Mechanical engineers take scientific discoveries and seek to make them into products that would be useful to people, companies, and governments.

Postsecondary Education

Texas Southmost College	South Texas College	Texas State Technical College	The University of Texas at Brownsville	The University of Texas - Pan American
	Associated of Science in Engineering		Bachelors of Science in Engineering Physics	Bachelors of Science in Mechanical Engineering

Local Employers

American Engineering Svc	Harlingen	Mundo Engineering	La Feria
Corona Engineering & Surveying	Brownsville	Rios Surveying CO	San Benito

Career Options

(Specific Job Types)

- Mechanical Engineer
- Design Engineer
- Product Engineer
- Mechanical Design Engineer
- Process Engineer
- Equipment Engineer
- Systems Engineer
- Design Maintenance Engineer
- Chassis Systems Engineer
- Commissioning Engineer

Salary Ranges

Wages for **Wages for Materials Engineers**

Location	Pay Period	2012				
		10%	25%	Median	75%	90%
United States	Hourly	\$25.43	\$32.16	\$40.94	\$51.69	\$62.51
	Yearly	\$52,900	\$66,900	\$85,200	\$107,500	\$130,000
Texas	Hourly	\$23.71	\$28.48	\$37.03	\$47.31	\$62.94
	Yearly	\$49,300	\$59,200	\$77,000	\$98,400	\$130,900

Professional Associations linked to the Careers

For information about general engineering education and mechanical engineering career resources, visit

- [American Society of Mechanical Engineers](#)
- [American Society for Engineering Education](#)
- [Technology Student Association](#)

For more information about licensure as a mechanical engineer, visit

- [National Council of Examiners for Engineering and Surveying](#)
- [National Society of Professional Engineers](#)

For information about accredited engineering programs, visit

[ABET](#)

Sources

The information provided in this document was collected from the following sources:

- Occupational Outlook Handbook (<http://www.bls.gov/ooh/>)
- O*NET OnLine (<http://www.onetonline.org/>)
- Texas CARES (<http://www.texascaresonline.com/>)
- CareerOneStop (<http://www.careeronestop.org/>)



Mechanical Engineers

Cluster Overview: Planning, managing, and providing scientific research and professional and technical services including laboratory and testing services, and research and development services.

Career Goal (O*NET Code): (17-2141) - Mechanical engineering is one of the broadest engineering disciplines. Mechanical engineers research, design, develop, build, and test mechanical devices, including tools, engines, and machines.

Student Name: _____

Grade: _____

School: _____

SUGGESTED COURSEWORK

EXTENDED LEARNING EXPERIENCES

Middle School	8th	HS Courses:	(Local districts may list high school credit courses here)
High School	9th	Core Courses:	English I Algebra I Biology World Geography Languages other than English I Physical Education
		Career-Related Electives:	Introduction to Engineering Design
	10th	Core Courses:	English II Geometry Chemistry World History Languages other than English II
		Career-Related Electives:	Principles of Engineering
	11th	Core Courses:	English III Algebra II Physics United States History Professional Communications
		Career-Related Electives:	Digital Electronics
	12th	Core Courses:	English IV Precalculus/Engineering Mathematics Engineering Design & Problem Solving Government/Economics Fine Arts recommended *Calculus
		Career-Related Electives:	Engineering Design and Development, Civil Engineering Design and Architecture, Computer Integrated Manufacturing

Curricular Experiences:
[Camp SOAR-Aerospace Engineering-Texas A&M University](#)
[Aerospace Academy-San Jacinto College](#)
[Project Lead the Way](#)
[Skills USA](#)
[Technology Student Association](#)
[The Infinity Project](#)

Career Learning Experiences:
 Career Preparation
 Job Shadowing
 Internship

Extracurricular Experiences:
 Destination ImagiNation
 High School Students United with NASA
 International Bridge Building Contest
 Marine Advanced Technology Education Center
 National Engineering Design Competition
 UIL Academic Competitions
 Aerospace Summer Camps

Service Learning Experiences:
 Campus Service Organizations
 Community Service Volunteer
 Peer Mentoring/Peer Tutoring

COLLEGE CREDIT OPPORTUNITIES -- High School

Students should take Advanced Placement (AP), International Baccalaureate (IB), dual credit, Advanced Technical Credit (ATC), or locally articulated credit courses, if possible. List those courses that count for college credit on your campus.

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Career Options:

Professional Associations:
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[American Society for Engineering Education](#)
[Technology Student Association](#)

Postsecondary	Texas Southmost College South Texas College Texas State Technical College		
		Associated of Science in Engineering	
		University of Texas at Brownsville	University of Texas - Pan American
		Bachelors of Science in Engineering Physics	Bachelors of Science in Civil Engineering

- Mechanical Engineer
- Design Engineer
- Product Engineer
- Mechanical Design Engineer
- Process Engineer
- Systems Engineer
- Design Maintenance Engineer
- Chassis Systems Engineer
- Commissioning Engineer
- Equipment Engineer

[National Council of Examiners for Engineering and Surveying](#)
[National Society of Professional Engineers](#)
[ABET](#)

Students may select other elective courses for personal enrichment purposes.

This plan of study serves as a guide, along with other career planning materials, for pursuing a career path and is based on the most recent information as of 2012. All plans meet high school graduation requirements as well as college entrance requirements.