

A Career Guide for the Immigrant Professional

BECOMING A MECHANICAL ENGINEER

in Pennsylvania



Welcoming
Center *for*
NEW PENNSYLVANIANS

*Connecting immigrants, employers,
and communities*

This Career Guide for the Immigrant Professional includes a job description, job prospects, salary ranges, potential employers, and the certification process for entering a mechanical engineering profession.

The guide also outlines the eight steps to become licensed as a mechanical engineer in Pennsylvania. In the United States, you are required to be licensed if you want to offer your services as an engineer to the public. In obtaining this licensure, you are considered to be a “professional engineer.”¹ In addition to reading this guide for logistical information, you may want to seek a mentor for advice on the specific career path you wish to pursue within this profession. Even if you have worked as a mechanical engineer in your home country, you will need to obtain certain credentials in order to work in Pennsylvania. This process can be lengthy; it may be helpful to find a survival-level job or an internship within the field of engineering where you will earn valuable work experience in the meantime.

NOTE:

Abbreviations used in this guide include:

ABET: Accreditation Board for Engineering and Technology

CPEES: Center for Professional Engineering Education Services

EES: Engineering Examination Services, a division of PCS

EIT: Engineer in training

FE Exam: Fundamentals of Engineering Examination

PCS: Professional Credential Services

PA PE Exam: Principles and Practices/Professional Engineering Examination

PE: Professional Engineer

A JOB DESCRIPTION

What does a mechanical engineer do in the United States?²

Mechanical engineers research, develop, design, manufacture, and test tools, engines, machines, and other mechanical devices. Engineers in this field work on machines such as electric generators, internal combustion engines, and steam and gas turbines. They work on machines such as refrigeration and air-conditioning equipment, machine tools, material handling systems, elevators and escalators, industrial production equipment, and robots used in manufacturing. Mechanical engineers also design tools that other engineers need for their work.

Mechanical engineers usually work in an office building, a laboratory, or an industrial plant. Often they use computers for modeling and simulation.²

B JOB PROSPECTS

What are my job prospects as a mechanical engineer in Pennsylvania?³

Mechanical engineering is a broad engineering field that includes many specialties and covers a wide range of education and skills. Mechanical engineers can have different kinds of jobs in production operations, maintenance, or technical sales.

Employment of mechanical engineers in Pennsylvania is expected to grow from approximately 7,710 jobs in 2004 to approximately 8,050 jobs in 2014. Mechanical engineers can expect about 245 total annual openings in 2014.

C SALARY RANGE

What kind of salary can I expect?⁴

Pennsylvania Entry-Level Salary	\$46,090
Pennsylvania Average Salary	\$70,150
U.S. Average Salary	\$70,000

1 Occupational Outlook Handbook, 2008-09. U.S. Department of Labor. <http://www.bls.gov/oco/ocos027.htm>

2 Occupational Outlook Handbook, 2008-09. U.S. Department of Labor. <http://www.bls.gov/oco/ocos027.htm>

3 "Mechanical Engineers." Pennsylvania Occupational Outlook Handbook, 2006 Edition. PA Department of Labor & Industry. http://www.paworkstats.state.pa.us/paooh/5_mech_eng.pdf

4 Pennsylvania Career Guide 2007-2008. PA Department of Labor & Industry. http://www.paworkstats.state.pa.us/carguide/CG_07-08_Part_2.pdf. pg. 21

D POTENTIAL EMPLOYERS

Who employs mechanical engineers?

Mechanical engineering jobs can be found in a variety of industries. These include: mining, utilities, construction and contracting, manufacturing (including food, textile, beverage and tobacco products, paper, printing, plastics, and others), wholesale and retail trade, transportation and warehousing, information, real estate, professional, scientific and technical services, company management, administrative and support services, and many others.⁵

Mechanical engineers work for:

- Transportation companies like Amtrak
- Equipment manufacturers
- Consulting firms
- Utility companies like PECO Energy
- Materials processing plants
- Local, state, and federal government

E QUALIFICATIONS NEEDED TO ENTER THE PROFESSION

In order to offer your services to the public, you must become a “professional engineer” or PE by being licensed. This is a common requirement in all 50 U.S. states.

Who licenses mechanical engineers?

The State Registration Board for Professional Engineers, Land Surveyors and Geologists licenses engineers to practice in Pennsylvania. For more information, contact:

State Registration Board for Professional Engineers, Land Surveyors and Geologists⁶

P.O. Box 2649

Harrisburg, PA 17105-2649

TELEPHONE: 717-783-7049

FAX: 717-705-5540

EMAIL: ST-ENGINEER@state.pa.us

WEB: www.dos.state.pa.us/eng

⁵ National Employment Matrix, employment by industry, occupation and percent distribution, 2006 and projected 2016. “Mechanical Engineers.” US Department of Labor. <http://www.bls.gov/oco/ocos027.htm>

⁶ State Registration Board for Professional Engineers, Land Surveyors and Geologists. <http://www.dos.state.pa.us/bpoa/cwp/view.asp?a=1104&q=432715>

How do I become a licensed mechanical engineer?⁷

Education

With few exceptions, you must complete a four-year accredited Bachelor of Science degree in engineering in the U.S. or an equivalent degree from an international institution certified by the Accreditation Board for Engineering and Technology (ABET).⁸ The Center for Professional Engineering Education Services (CPEES) is the credential evaluation service which will determine whether your degree is the equivalent of a four-year U.S. degree. The evaluation of your bachelor's degree is required even if you have a graduate degree from a university in the United States. You will learn more about getting your degree evaluated by CPEES as you read through this document.

NOTE:

This guide is for immigrants who have a bachelor's degree in engineering or a related field. If you do not have a bachelor's degree or if your university was not certified by ABET, you may still qualify to take the examination if you have a specified amount of qualifying experience under the supervision of a professional engineer. For more information on the educational requirements, see the qualifications from the State Licensing Board.⁹

Examination

You must receive satisfactory scores on two examinations:

- Fundamentals of Engineering Examination
- Professional Engineering Examination

Information about how to prepare for and become eligible for these examinations can be found on page 6, in "The Eight Steps to Becoming a Licensed Mechanical Engineer in Pennsylvania."

Experience

Once you pass the Fundamentals of Engineering examination, you will receive a certificate to work as an Engineer-in-Training (EIT). EITs must have four or more years of progressive experience in engineering work, earned after the issuance of the EIT certificate and under the supervision of a professional engineer or similarly qualified individual. You can apply to take the Professional Engineering Examination after you complete the experience requirement.

Certification

After you have completed the required education, examinations, and experience detailed above, you are ready to begin the process of certification. The information on page 6 outlines the eight steps you need to take to become a licensed mechanical engineer in the state of Pennsylvania.

⁷ "Licensure Information." State Registration Board for Professional Engineers, Land Surveyors and Geologists. <http://www.dos.state.pa.us/bpoa/cwp/view.asp?a=1104&q=432708>

⁸ Accreditation Board for Engineering and Technology (ABET) Website: <http://www.abet.org>

⁹ FAQ's November 2006. State Registration Board for Professional Engineers, Land Surveyors and Geologists. http://www.dos.state.pa.us/bpoa/lib/bpoa/20/eng_board/faqs_-_engineer_board.pdf

F OTHER OPTIONS

What are some alternative positions in the engineering field that do not require an engineering license?

The engineering examinations and licensing process are time consuming and can be costly. If you choose not to become a licensed engineer, there are other jobs in which you can apply your engineering skills. You may want to see if your skills match these other occupations as well. Other occupations that are related to the field of mechanical engineering include: other types of engineering, natural science managers, physical and life scientists, mathematicians, computer systems analysts, computer engineers, computer scientists and architects.¹⁰ Some specific jobs are described below:

Position	Salary Range	Responsibilities	Minimum Qualifications
Drafter	\$31,460-\$47,800	Prepare technical drawings and plans used by production and construction workers	Postsecondary training and Computer-Aided Design (CAD) degree preferred; courses in computer technology, math, science, design and computer graphics preferred; mechanical and visual aptitude
Science technician	\$31,000-\$65,000 (depends on field)	Apply the principles and theories of science and mathematics to solve problems in research and development	Associate's degree or at least 2 years of specialized training; Bachelor's degree is sometimes required
Computer programmer	\$47,580-\$81,280	Write, test, and maintain computer programs.	Associate's degree or certificate may qualify but Bachelor's degree is preferred; many employers look for previous experience
Computer and information systems manager	\$71,650-\$118,330	Plan, coordinate, and direct research and facilitate the computer-related activities of organizations	Bachelor's degree

¹⁰ "Mechanical Engineers." Pennsylvania Occupational Outlook Handbook, 2006 Edition. PA Department of Labor & Industry. http://www.paworkstats.state.pa.us/paooh/5_mech_eng.pdf

G WHAT ARE THE NEXT STEPS IN GETTING A JOB?

In addition to this guide, the Welcoming Center has published *How to Succeed in the Workplace*, a general guide to conducting a successful job search in the United States. This guide is located at: www.welcomingcenter.org/documents/HowToSucceed.pdf.

The Welcoming Center has many years of experience working with immigrant professionals who are trying to rebuild their careers here in the U.S. We have discovered that rebuilding your career requires accumulating social capital. Much like starting a business, where you must collect and save financial capital and resources, transferring your career to a new country requires collecting and building *social* capital. Social capital includes your knowledge of American business culture, your network of professional contacts, and similar resources.

Whether you are looking for a job as a mechanical engineer or another position within the field, it will be useful to find a career mentor who can help guide you through the process. In addition, you should look for opportunities where you can network with others in the engineering field such as career fairs, professional societies, public lectures, conferences, or any other event which might bring together mechanical engineers.

The Welcoming Center for New Pennsylvanians helps work-authorized immigrants with job placement regardless of your educational background and skill level. Please contact us at:

Welcoming Center for New Pennsylvanians

1617 John F. Kennedy Boulevard, 13th Floor

Philadelphia, PA 19103

PHONE: 215-557-2626

EMAIL: info@welcomingcenter.org

WEB: www.welcomingcenter.org

OTHER USEFUL LINKS

American Society of Mechanical Engineers: <http://www.asme.org>

Mechanical Engineering Magazine: <http://memagazine.asme.org>

Mechanical Engineering Jobs: <http://www.mechanicalengineer.com>

Sources

We have drawn on a variety of sources in our research, but are most indebted to the U.S. Department of Labor, the Pennsylvania Department of Labor and Industry, and the Pennsylvania State Registration Board for Professional Engineers for their invaluable information.

THE EIGHT STEPS TO BECOME A LICENSED MECHANICAL ENGINEER in Pennsylvania

1 HAVE YOUR CREDENTIALS EVALUATED

Internationally-educated applicants are required to have their credentials evaluated in order to take the Fundamentals of Engineering Examination. If you were educated outside the United States, you need to determine whether your college is certified by ABET. ABET has a list of programs that are substantially equivalent (comparable in program content and educational experience) to engineering programs in the United States.¹¹ Please check this document to see if your college or university is listed. If your college is not listed or if you have additional questions, you can speak to a representative at ABET by calling 410-347-7700.

The International Engineering Alliance website also contains information about the accreditation of engineering degree programs.¹² The Washington Accord, signed in 1989, is one of six international agreements among bodies responsible for accrediting engineering degree programs. It recognizes substantial equivalence in the accreditation of qualifications in professional engineering normally of four years duration. You can see if your program is listed under the Washington Accord by looking at <http://www.washingtonaccord.org/Washington-Accord/Accredited.cfm>.

If your program is not included, there are a few options you can consider that do not require an engineering license. We have provided some suggestions on page 4. You might also consider going back to school in the United States. You can find information on accredited U.S. engineering programs by calling ABET or going to the website at <http://www.abet.org>.

11 Substantially Equivalent Programs. ABET. <http://www.abet.org/Linked%20Documents-UPDATE/International/06%20Substantially%20Equivalent.pdf>

12 International Engineering Agreements. International Engineering Alliance. <http://www.washingtonaccord.org>

COMPLETE YOUR APPLICATION FOR CREDENTIAL EVALUATION

2

Please read the CPEES Frequently Asked Questions (FAQs) prior to submitting your application.¹³
Complete the CPEES online application for Evaluation of International Educational Credentials.¹⁴

NOTE:

Section III of the application will ask you for your education history.

You will select the **country** and the **institution** where you received your degree. If you do not see your country or your institution does not appear in your country's list of institutions, please call CPEES at (800)464-7650. **Do not close the browser window or you will have to restart the application process.**

Fees:

You will need to enter a credit card number to pay the \$375 application fee. If you prefer to submit payment with a cashier's check or official bank check, please fill out the forms online and submit the data. There is a \$25 additional handling fee for applications not submitted online. **Print a copy of the confirmation screen and mail your \$400 check to:**

NCEES

P.O. Box 1686
Clemson, SC 29633-1686

The initial evaluation fee of \$375 covers the review, authentication, and preparation of two evaluation reports. The licensing board receives one report electronically, and the other report is mailed to you as a hard copy. Upon receipt of a completed application, NCEES will assign an application number and notify you by email of all records needed to complete your review and evaluation. If you request academic documentation after your application has been filed, please write your file (application) number on the Transcript Request Form and all correspondence with NCEES.

GET THE REQUIRED DOCUMENTATION TO SUPPORT YOUR APPLICATION

3

CPEES provides detailed information on their website about the required documents needed to support your application. **Please read this information carefully before requesting official transcripts**, getting your transcripts translated, and providing course descriptions.¹⁵

¹³ FAQs. Center for Professional Engineering Education Services. <http://www.cpees.org/faqs.php>

¹⁴ Application for Evaluation of International Educational Credentials. Center for Professional Engineering Education Services. <https://commerce.ncees.org/credentials/application/>

¹⁵ "Required Documentation." Application for Credential Evaluation. Center for Professional Engineering Education Services. <http://www.cpees.org/application.php#transcripts>

Official Transcripts and Degree Verification

Send the Transcript Request Form (provided by NCEES) to all academic institutions where you completed postsecondary credit courses and from which you received a degree or professional qualification. The official transcripts and academic records must be prepared in the traditional institutional format and official language. The transcripts and records should list all courses attempted, all grades received, include class hours and credits, contain the official seal for the institution and be signed by officials at the institution. Have them send an official transcript and verification of degree directly to CPEES in a sealed and stamped envelope:

Center for Professional Engineering Education Services

10305 NW 41st Street, Suite 223
Miami, FL 33178

Translations

An official literal or word-by-word English translation must accompany all records (transcript and degree) issued in the native language. Translations must mirror the official native language record and include all data presented in the original document in the same format and order. Translated documents do not constitute official documents and cannot be used for evaluation purposes. However, they must be prepared and signed by a certified translator in the home country or in the United States. All translations must be sent directly to CPEES and should include contact information for the translator.

Course Descriptions

If it is not stated in your university records, you should include course descriptions that show the content of your completed courses and the number of hours completed. Information about course content is necessary to establish the nature and level of the course, and determine its applicability to the program.

COMPLETE THE PAPERWORK TO SCHEDULE THE 4 FUNDAMENTALS OF ENGINEERING EXAMINATION (PA 11)

The Pennsylvania State Registration Board of Professional Engineers, Land Surveyors and Geologists uses Professional Credential Services (PCS) to run the test. Engineering Examination Services (EES), a division of PCS, provides a Candidate Information Bulletin that contains detailed information on the scheduling process.¹⁶ **Please read the bulletin prior to submitting your application.**

¹⁶ Pennsylvania Fundamentals of Engineering. Professional Credential Services, Inc.
<http://www.pcshq.com/pcsweb/PCSCandPg.nsf/AED/ad2f36e46d3b98e086256d2f00551bb4?OpenDocument>

Materials to be submitted

You must submit the following materials by the postmarked deadline (December 1 for the April examination and July 1 for the October examination):

1. Completed and signed scheduling form (PA11).¹⁷
2. Certified check or U.S. money order for \$175 made payable to EES.
(Record your social security number on the check.)
3. Amplified Record of Experience (if applying based on experience).
4. One of the following:
 - a. Completed Report of Student Status form for current students of a four-year ABET accredited B.S. engineering program
 - b. Original final transcript, showing the curriculum and date your degree was conferred, from a 4-year ABET accredited engineering program mailed directly to EES by the college or university
 - c. ABET equivalent CPEES foreign evaluation for applicants who received their bachelor's degree from a school outside of the U.S.
 - d. Five references for applicants applying under experience. Please note: These must be professional references, not personal. If you have questions, please refer to the Reference Information form at: [http://www.pcshq.com/pcsweb/PCSCandPg.nsf/FNL/47REF600ReferenceForm2007/\\$file/47REF600ReferenceForm2007.pdf](http://www.pcshq.com/pcsweb/PCSCandPg.nsf/FNL/47REF600ReferenceForm2007/$file/47REF600ReferenceForm2007.pdf)
 - e. M.S. degree candidates must submit M.S. transcript and either a CPEES evaluation of a B.S. degree (if their degree is from an international institution) or a B.S. degree transcript from an institution in the U.S.

Mail your materials to:

Engineering Examination Services

PA ENG

P.O. Box 198689

Nashville, TN 37219-8689

NOTE:

Include a self-addressed stamped envelope/postcard with your form in order to receive confirmation that it has been received by EES. It will take approximately four to six weeks for full processing of the scheduling form. Approximately two weeks prior to the examination, an admission notice will be mailed to you that will include dates, times, and locations of the examination.

¹⁷ Scheduling Form PA 11 For Fundamentals of Engineering Examinations. Engineering Examination Services.
[http://www.pcshq.com/pcsweb/PCSCandPg.nsf/FNL/PAFE-SCHEDULINGFORM052008/\\$file/PAFE-SCHEDULING%20FORM%20052008.pdf](http://www.pcshq.com/pcsweb/PCSCandPg.nsf/FNL/PAFE-SCHEDULINGFORM052008/$file/PAFE-SCHEDULING%20FORM%20052008.pdf)

5 TAKE THE FUNDAMENTALS OF ENGINEERING EXAMINATION

The Fundamentals of Engineering examination is an 8-hour closed book examination beginning at 8:00 a.m. and ending at 5:30 p.m. A one-hour break will be given between morning and afternoon test sessions. The exam contains 120 questions in the morning section and 60 questions in the afternoon section. For details about the exam, go to http://www.ncees.org/exams/fundamentals/fe_exam_specs.pdf.

Examination results will be mailed approximately 10 to 12 weeks after the examination. If you pass the examination, you will receive an Engineer-in-Training certificate. If you do not pass the examination, your result letter will explain how to re-schedule.

6 COMPLETE YOUR EXPERIENCE REQUIREMENTS

You must have completed at least four years of progressive experience in engineering work under the supervision of a professional engineer or similarly qualified individual before you are eligible to take the Professional Engineering Examination.

7 COMPLETE THE PROFESSIONAL ENGINEERING EXAMINATION APPLICATION

(Also called the Principles and Practice Examination, or the PA PE)

Please read the Candidate Information Bulletin before completing your application.¹⁸ You must have passed the Fundamentals of Engineering Exam (FE) in order to take the Principles of Engineering Exam in Pennsylvania. You should read the Law and Examination Qualifications chart at [http://www.pcshq.com/pcswweb/PCSCandPg.nsf/FNL/engfelaw070204/\\$file/ENG%20-%20THE%20LAW%20AND%20EXAMINATION%20QUALIFICATIONS%20-%20August%202004.pdf](http://www.pcshq.com/pcswweb/PCSCandPg.nsf/FNL/engfelaw070204/$file/ENG%20-%20THE%20LAW%20AND%20EXAMINATION%20QUALIFICATIONS%20-%20August%202004.pdf) in order to determine your qualifications.

¹⁸ Pennsylvania Candidate Information Bulletin for Professional Engineering Examination. Engineering Examination Services. [http://www.pcshq.com/pcswweb/PCSCandPg.nsf/FNL/PACIBPEFT04102008/\\$file/PA%20CIB%20PE%20FT%2004102008.pdf](http://www.pcshq.com/pcswweb/PCSCandPg.nsf/FNL/PACIBPEFT04102008/$file/PA%20CIB%20PE%20FT%2004102008.pdf)

File your application

You must complete and submit the PA PE application (47-PEX900) with a check or money order of \$100 made payable to EES.¹⁹ Send a self-addressed stamped envelope in order to receive confirmation that your application has been received by EES. Send your application and check to the following address:

EES

Attn: PA PE
P.O. Box 198689
Nashville, TN 37219-8689

The eligibility application deadline is December 1 for the April examination and July 1 for the October examination.

The Board will send you an approval letter (by mail or email) stating that you have been approved to take the examination. You must receive an approval letter from the Board before you can contact EES and schedule to take the examination. The approval letter will tell you how to schedule for the next possible examination. At that time, the \$260 scheduling fee for the Professional Engineering examination will be due. **You cannot transfer the fee to a different exam or postpone your exam date for any reason.**

The application should be printed and reviewed before you fill it out.

The application requires very specific and detailed information, and must be typed or completed in blue or black ink. Below is some additional information about the application process and documents required:

Verification of Examination/Registration

If you passed the Fundamentals of Engineering in Pennsylvania, you do not need to complete this section.

Education

Your college or university must mail the transcript directly to the EES office. If your bachelor's degree is from a school outside the United States, contact CPEES to have them mail your credential evaluation directly to EES. CPEES charges \$35 for every two copies of your degree evaluation report that you request. You must do this if your bachelor's degree is from a school outside of the U.S., even if you also have a graduate degree from a U.S. school.

Amplified Record of Experience

The original completed amplified record must be included with your application when submitted to EES. In addition, you must attach a copy of your completed amplified record to each of the reference forms for dissemination to each individual being used as a reference.

References

References are people you have worked with who have personal knowledge of your experience and can attest to your experience. It is recommended that you use an immediate supervisor as a reference. The application provides you with guidelines for selecting your references.

¹⁹ Pennsylvania Application Instructions. State Registration Board for Professional Engineers, Land Surveyors and Geologies. http://www.pcsdq.com/pcsweb/PCSCandPg.nsf/FNL/47-PEX900-PEExam_041207_/_file/47-PEX900%20%20-%20PE%20Exam%20_041207_.pdf

Criminal and Disciplinary Information

If you answer “YES” to any question in Section 8 of the PA PE application, you must attach a full explanation and submit a certified copy of all relevant court and/or legal documents. If you answer “Yes” to any of the Section 8 questions, it does not mean that your application will automatically be denied.

Social Security Act Certification

Sign and date the Social Security certification on page 3 of the application.

Certification Statement

The Certification Statement, Section 11 on page 4 of the application, must be signed and dated.

8 TAKE THE PROFESSIONAL ENGINEERING EXAMINATION

Take the Professional Engineer Examination on the date and location specified on your admission notice. The Professional Engineering examination is an 8-hour examination beginning at 8:00 a.m. and ending at 5:30 p.m. A one-hour break will be given between morning and afternoon test sessions. You must arrive at least 30 minutes before your scheduled examination time. You will not be admitted into the examination if you arrive after the announcements have been given for that exam section. When you receive your admissions notice for the exam, it will contain detailed information about what to do when you arrive at the examination center.

How much does it cost to become certified?

CPEES initial evaluation charge:	\$375
Praxis - Prices vary according to certification	\$175
Principles of Engineering:	\$100 + \$260
Total	Approx. \$910

NOTE:

It is recommended that mechanical engineers continue their education in the latest technology because it is a field where they must stay up-to-date on improved machinery and advanced processes.²⁰

²⁰ “Mechanical Engineers.” Pennsylvania Occupational Outlook Handbook, 2006 Edition. PA Department of Labor & Industry. http://www.paworkstats.state.pa.us/paoooh/5_mech_eng.pdf

For further assistance, please contact our
employment specialists at 215-557-2626
or visit us online at welcomingcenter.org.

Founded in 2003, the Welcoming Center for New Pennsylvanians is a nonprofit 501(c)(3) organization that works to promote immigrant participation in the region's economic, political, and social life. These individuals enhance the productivity, profitability, and stability of the region's businesses and contribute to the state's overall economic growth.

MAIN OFFICE

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1617 John F. Kennedy Boulevard
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www.welcomingcenter.org

Our United Way donor option
number is 14726.

**Welcoming
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NEW PENNSYLVANIANS

*Connecting immigrants, employers,
and communities*