

Certificate in Power and Energy (P&E)

P&E Certificate Description

Almost all industrial complexes and larger commercial and public buildings have a system of support utilities, which includes equipment that requires engineers trained in power and energy to operate and maintain. This could range from a single electrical motor or transformer to a complex system of generation, transmission and distribution, including turbines, energy automation systems, and *smart grid* technologies. P&E engineers research and implement ways to integrate renewable power technology and are often involved in public works projects, and employed on federal projects that involve the integration of large power grids

The Philip M. Drayer Department of Electrical Engineering (LUEE) offers the certificate in P&E as a set of elective courses to BSEE holders, specifically engineers in industry, to prepare these engineers for work at a diverse range of power and energy relevant companies. The certificate was designed to cover industry necessities including design and implementation of electric machines and power electronics drives, control of the dynamics of power generation units, power system monitoring and protection, power system modeling and the concept of the smart grid.

Facilities that typically require power and energy engineers trained in the areas covered by the certificate include, but are not limited to, power and chemical plants, transmission and distribution facilities, utilities, chemical and petrochemical plants, pulp mills, sawmills, food production plants and any industrial organization that consumes power. The certificate will be awarded to students who successfully pass the P&E courses described below. P&E students need not be enrolled in the LUEE MSE/EE program.

P&E Certificate Details

The P&E certificate at Lamar University offers professionals graduate level training options in six topical areas relevant to the industry. Candidates take four core courses and then select one of two electives to receive the certificate. The program has been specifically designed for electrical engineers in industry who wish to assume new or increased responsibilities in the power and energy industry.

Program Outcomes

After completing the P&E certificate, the learners will be able to achieve the following objectives:

- Implement power electronics drives on various types of electric machines.
- Understand power systems controls, multi-area and automatic generation control.
- Dynamic modeling and analysis of power generation, transmission and distribution components.
- Apply engineering sciences to the design, analyses and steady-state operation of power apparatus in stable power systems.
- Apply modern simulation (PowerWorld/Windmill) and mathematical (Mathcad and/or Matlab) tools for the design, analyses, and performance of power system networks.



- Formulate the requisite problem solving skills associated with power system analysis and design.
- Design power system networks to meet desired operation conditions and specifications.
- Design current and voltage transformers in power system protection.
- Design DSP-based relays and understand associated functions such as aliasing, sampling, Discrete Fourier Transform and its application to current and voltage phasor estimation.
- Design and compare numerical relaying algorithms for over current, distance and differential protection with application to transmission systems to include transformer and bus bar protection.
- Discuss and implement wide area monitoring, protection and control (WAMPAC).

Certificate Requirements*

Core Courses:

ELEN 5301: Electric machines and power electronics drives (fall semester)

ELEN 5301: Power system stability and control (spring semester)

ELEN 5301: Research seminar in power and energy (Winter or May mini semester)

ELEN 5301: Power system monitoring and protection (summer I semester)

Elective Courses:

ELEN 5301: Advanced Power Electronics (fall semester)

ELEN 5301: Electric System Modeling (introduction to smartgrid) (Summer II semester)

* Candidates should take one course per semester in spring and fall, with two in summer along with the research seminar in either the winter or may mini-session to fulfill the certificate in a one-year period.

Requirements to Apply:

- Bachelor of Science in Electrical Engineering (BSEE)
- Experience in industry related to power and energy
- Registration as a student at LU (may be non-degree seeking)