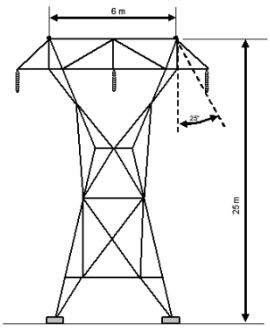
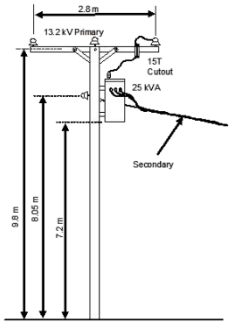
Master of Science Degree Distance Learning Cohort Program in Power Engineering





The Clarkson University MSEE distance power engineering cohort program includes 6 required courses, 3 elective courses, 2 credits of seminar and a 1 credit design project. The program is operated on a quarter schedule, and it takes 2.5 years (10 quarters) to graduate. On graduation, students will receive a Master's of Science degree in Electrical Engineering, and an Advanced Certificate in Power Engineering.

The 6 required courses are:

EE 680 Power Systems I
EE 681 Power Systems II
EE 537 Protective Relaying for Power Systems
EE 638 Grid Connected Renewable Energy Systems
ES 510 Strategic Project Management
BOE 610 Fundamentals of Business of Energy

A range of options exist for the elective courses, which are chosen in consultation with the student's advisor. However, at least one elective must be an EE course. Potential electives directly in the power engineering area include such courses as: Power Distribution, Microgrids, High Voltage Techniques and Measurements and Power System Planning.

Course Descriptions—Required Courses

EE 680 Power Systems I. Power and energy in AC circuits. Single-phase, three-phase and poly-phase circuits in balanced and unbalanced regimes. Measurement of three-phase power. Determination of three-phase sequence. Single-line diagrams. Per-unit method of representation and computations. Transformers and synchronous machines in power systems. Parameters of transmission lines.
Prerequisite: Electric Circuits or equivalent.

EE 681 Power Systems II. Wave-propagation in transmission lines. Analysis of power networks, load-flow solutions and control. Three-phase faults and symmetrical components. Power system protection. Stability of power systems.
Prerequisites: Electric Circuits or equivalent.

EE 537 Power System Protection. Power system fault performance, protective system goals, fault sensing and protection algorithms. Applications to generator, transformer, bus transmission line, and distribution line protection. Distributed generation and the connection to the grid. Prerequisite: EE333, or EE 681, or knowledge of symmetrical components and fault current calculations.

EE 638 Grid Connected Renewable Energy Systems. Power grid energy resources. The solar resource, photovoltaic cell characteristics, solar array performance. Wind energy principles, wind turbine characteristics. Maximum power point operation. Energy storage systems. Grid integration issues.

BOE 610 Fundamentals of Business of Energy. An initial umbrella course designed to acquaint the student with the complexities of the present-day power system and how we arrived at this point. It will include a brief history of the industry evolution and will encompass various fuels, types of generation, regulatory authorities, power transmission, distribution, control & dispatch, planning, power markets and revenue flows.

ES 510 Strategic Project Management. A project is a one-time or infrequently occurring operation with a unique goal, a limited lifespan and limited resources. This course will focus on project management from a decision-making perspective and how projects can be used to implement organizational strategy. The course follows the project life cycle model from project initiation to implementation to termination. Topics covered include such things as project scope development, project selection, organizational strategy, leadership, team building, planning, conflict resolution, budgeting, resource allocation, information management, control, auditing, and termination procedures. Computer applications such as MS Project, case studies, project simulations and student project teams will be an integral part of the course. This course satisfies the educational prerequisite for the Project Management Institute's (PMI) Certified Associate in Project Management (CAPM) and Project Management Professional (PMP) certifications.

Representative Power Engineering Elective courses

EE 639 Electric Power Distribution Systems. A graduate level course on modern electric power distribution systems, with topics selected from: overhead and underground lines, voltage regulation, distribution faults and protection, reliability and power quality, lightning protection, grounding, interconnection of distributed generation, and distribution system control and communications.

EE 559 Microgrid Design and Control. The focus of the course will be microgrid design with PV, Wind, and Energy Storage, and their control and integration into the power systems using power electronics devices. Various topics will be covered in this course to provide students with cutting-edge knowledge in microgrid applications, design, and control. In this course, students will have a chance to 1) learn power converters (DC/DC,DC/AC, and AC/DC) and utilize the converters to create an AC or DC Microgrid with PV, Wind, or Batteries, 2) learn how to control the power quality (voltage, frequency) in islanded and grid-connected modes, 3) learn how to regulate the power flow in islanded and grid-connected modes, and 4) learn about anti-islanding controls and low voltage ride through requirements.

EE 531 Power System Planning. Long-term planning will identify a financially viable and physically feasible mix of resources, including traditional generation and transmission sources as well as advanced techniques such as renewable generation, demand response, and the microgrid, to enhance the overall reliability of power systems. This course will introduce the students to generation and transmission expansion planning of a vertically integrated utility within the framework of a competitive market.

EE 530 High Voltage Techniques and Measurements. Generation of high-voltage AC, DC and impulse. High-voltage dielectric loss measurements. Discharge measurements. High-voltage insulation problems.

Seminar Series

The seminar portion of the program is worth 2 credit hours and involves participation in a series of 1 hour seminars. Topics include advanced and/or emerging energy technologies in the power field such as energy storage technologies, smart grid, high penetration distributed resource integration, emerging advanced fuel-based power plant technologies, bulk power system operation, advanced photovoltaic power generation, electric vehicle power system integration, power quality analysis and enhancement, power system data mining and analysis, and many other topics of interest.

Special Design Project

The design portion of the program is worth 1 credit hour and is a project topic determined after consultation with a Clarkson advisor as being suitable subject matter to balance out and complement the overall program. Project may also involve a mentor at student's respective company. This is a topic jointly arrived at by the program advisor and the student. It may involve a technical report on an advanced energy technology related to the field, or a report on some specific research & development and/or analysis performed by the student, or other suitable project.

Program Admittance

This distance learning MSEE Power Engineering program is aimed primarily at engineers in the power industry including electric power utilities and/or companies involved in manufacturing equipment for, designing or analyzing electric power systems, who have a desire for continuing education that achieves a MSEE degree with a focus in Power Engineering.

Students enrolling in the program should have a Bachelor's Degree in Electrical Engineering or a related field. An engineering course in electric circuits is required to take the first required course (EE680). Applications to the program are reviewed based on prior academic experience and current work experience. The GRE requirement is waived for applicants with an ABET accredited engineering degree.

Financial Support

Partial tuition scholarships are generally available from Clarkson for this program.

Contact Information:

For application instructions, scheduling, enrollment availability for class offerings and more detail on course content and logistics please contact:

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