Undergraduate Certificate in Power and Energy

SACS Assessment
The Undergraduate Certificate in Power and Energy (UCPE) will be assessed using evaluations of specific student outcomes that are related to the mission and objective of the Certificate. This will be accomplished by evaluating student performance in specific courses that address each student outcome.

Mission
The mission of the Undergraduate Certificate in Power and Energy is to enhance student education in power and energy to enable them to pursue meaningful careers in the power and energy field or in fields related to power and energy.

Objective
The objective of the Undergraduate Certificate in Power and Energy is to enhance student education in power and energy through an interdisciplinary curriculum that integrates areas of (1) global energy issues; (2) at least one of: (a) power generation, (b) transmission and distribution, or (c) public policy; and (3) breadth of knowledge in power and energy.

Course Requirements
The certificate consists of 15 credit hours in power and energy courses, consisting of one required course, one core elective course, and three power and energy electives. The required course is EGR 240 – Global Energy Issues. The core requirement is fulfilled through the completion of one of the following three courses: EGR 540 – Electric Power Economics and Public Policy, EGR 542 – Electric Power Generation Technologies, or EGR 546 – Electric Power Transmission and Distribution. The three power and energy electives can be selected from the list of approved power and energy electives. The courses selected by the student must be approved by the Director of the Undergraduate Certificate in Power and Energy to ensure that the selections maintain a thematic consistency and fulfill the certificate requirements. A partial list of approved power and energy courses is provided below. Additional courses will be added as they are approved for the power and energy certificate curriculum.

BAE 503 – Fundamentals of Biorenewable Resource Engineering
BAE 504 – Biofuels
CE 351 – Intro to Environmental Engineering
CE 433 – Railway Freight and Passenger Operations and Intermodal Transportation
CE 533 – Railroad Facilities Design and Analysis
CME 200 – Process Principles
CME 320 – Engineering Thermodynamics
CME 515 – Air Pollution Control
EE 415G – Electromechanics
EE 518 – Electric Drives
EE 531 – Alternative and Renewable Energy Systems
EE 535 – Power Generation, Operation, and Control
EE 536 – Power System Fault Analysis and Protection
EE 537 – Electric Power Systems I
EE 538 – Electric Power Systems II
EE 539 – Power Distribution Systems
*EGR 540 – Electric Power Economics and Public Policy
*EGR 542 – Electric Power Generation Technologies
*EGR 546 – Electric Power Transmission and Distribution
ME 321 – Engineering Thermodynamics II
ME 325 – Elements of Heat Transfer
ME 530 – Gas Dynamics
ME 548 – Aerodynamics of Turbomachinery
ME 549 – Power Generation
ME 563 – Basic Combustion Phenomena
ME 580 – Heating Ventilating and Air-Conditioning
MNG 511 – Mine Power System Design
MNG 575 – Coal Processing Plant Design

* Any of the power and energy core courses (EGR 540, EGR 542, EGR 546) can be used as a power and energy elective, provided it is not also being used as the power and energy core course by the student.

**Special Topics Courses**

BAE 599 – Biofuels
BAE 599 – Building Energy Modeling
BAE 599 – Build Model Renew Engr Des
BAE 599 – Build Model Nrenew Des
BAE 599 – Efficient Design of Solar Buildings
BAE 599 – Thermochemical Processing of Biomass
BAE 599/EE 599 – Solar Power
CE 599 – Control of the Construction Project
CE 599 – Public Policy In Engr Dec Sci
CE 599/EGR 599 – Environmental Consequences of Energy Production
CME 599 – Green Engineering
CME 599/MSE 599 – Electrochemical Energy Storage
CME 599 – Renewable Energy I
CME 599 – Renewable Energy II
CME 599/ME 599 – Sustainable Power and Energy Assessment
EE 599 – Power System Analysis Using Advanced Software
EE 599 – Power Electronics
EE 599 – Smart Grid Automation and Control of Power Systems
EGR 599/ME 599 – Nuclear Engineering
EGR 599 – Smart Grid Communications and Information Systems
ME 599 – System Thinking for Sustainability
ME 599 – Nuclear Engineering Design
ME 599 – Energy Assessment I
ME 599 – Rotodynamic Turbomachinery
Student Outcomes

Consistent with the objective of the undergraduate Certificate in power and energy are the student outcomes, listed in Table 1. Note that these outcomes are addressed by the structure of the UCPE, i.e., each outcome can be assessed by a standard of performance in specific courses that address the outcome, as illustrated in Table 1.

Table 1. Student Outcomes for the Undergraduate Certificate in Power and Energy

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Indication of Achievement</th>
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<tbody>
<tr>
<td>Students will demonstrate knowledge of global energy issues.</td>
<td>Completion of EGR 240 with a grade of C or better</td>
</tr>
<tr>
<td>Students will demonstrate knowledge of electric power as it relates to power generation, transmission and distribution, or economics and public policy.</td>
<td>Completion of EGR 540, EGR 542 or EGR 546 with a grade of C or better</td>
</tr>
<tr>
<td>Students will demonstrate breadth of knowledge in the power and energy field.</td>
<td>Completion of at least three credits in at least two different disciplines with a grade of C or better</td>
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Rubrics and Assessment of Student Outcomes

The Undergraduate Certificate in Power and Energy has been developed to serve a wide range of student interests in power and energy. Consequently, the rubrics and assessment has been developed to allow for this flexibility. The rubric, i.e., standard of performance, is the level of achievement attained by the student in each course. The following grade scale is used:

A: exceptionally high achievement as a result of aptitude, effort, and intellectual initiative
B: high achievement as a result of ability and effort
C: satisfactory achievement
D: unsatisfactory achievement
E: unsatisfactory performance and failure in the course

Based on this scale, a student must attain satisfactory achievement (Grade of C) or higher in each course that is applied to the certificate. Repeat options may be used.

Assessment of the Certificate

Because the mission of the UCPE is to enhance the student’s knowledge of the power and energy field and enable him/her to pursue a career in power and energy, the items listed in Table 2 will be used to assess the success and effectiveness of the certificate. This table also includes the assessment cycle time, goals, and measures of success.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Assessment Cycle</th>
<th>Goal</th>
<th>Measure of Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students Pursuing the UCPE</td>
<td>Annually</td>
<td>25 per year</td>
<td>20 per year</td>
</tr>
<tr>
<td>Number of Students Completing the UCPE</td>
<td>Annually</td>
<td>25 per year</td>
<td>16 per year</td>
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<tr>
<td>Percentage of Students Pursuing the UCPE Who Complete it</td>
<td>Annually</td>
<td>100%</td>
<td>≥ 80%</td>
</tr>
<tr>
<td>Job Offers at Graduation</td>
<td>Upon Graduation</td>
<td>100%</td>
<td>≥ 80%</td>
</tr>
<tr>
<td>Acceptance Rate into Graduate School</td>
<td>Upon Graduation</td>
<td>100%</td>
<td>≥ 80%</td>
</tr>
<tr>
<td>Review of the UCPE by the Power and Energy External Advisory Board</td>
<td>Every 3 years</td>
<td>Approval</td>
<td>Approval</td>
</tr>
</tbody>
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