ELECTROCHEMICAL ENGINEERING, MINOR

Requirements for a minor may be completed at any campus location offering the specified courses for the minor. Students may not change from a campus that offers their major to a campus that does not offer their major for the purpose of completing a minor.

Program Description

The Electrochemical Engineering minor is designed to equip students with the knowledge necessary to achieve the following educational objectives: become valuable contributors in addressing society's clean energy needs and demands especially in the electrochemical power generation sector; and become educators, practicing engineers, and national leaders in electrochemical energy conversion and storage. The minor integrates skill sets in fundamentals of electrochemistry (e.g., chemistry, physics, mathematics, thermodynamics, and chemical kinetics) and electrochemical engineering applications (batteries, solar, flow and fuel cells, electrochemical synthesis, and corrosion) to ensure successful career opportunities and growth within electrochemical power generation industries, government agencies, and academia. The curriculum should allow students in energy related programs such as chemical, civil, electrical, environmental, mechanical, and materials science and engineering to readily take advantage of the minor and be better prepared for careers in clean power generation and future green technologies.

What is Electrochemical Engineering?

Electrochemistry is the science that focuses on the process of transforming chemical energy into electrical energy. Electrochemical engineers investigate electrochemical energy conversion and storage to create sustainable and alternative energy. They research electrochemistry for applications such as energy storage, power generation, and green energy. Electrochemical engineers seek to improve energy technology within industries, government agencies, and academia.

You Might Like This Program If...

- You are interested in energy-related programs such as chemical, civil, electrical, environmental, mechanical, and materials science and engineering.
- You are interested in pursuing a career in clean power generation and future green technologies.

Program Requirements

Requirement	Credits
Requirements for the Minor	35

Requirements for the Minor

For the minor in Electrochemical Engineering, a minimum of 35 credits is required.

A grade of C or better is required for all courses in the minor, as specified by Senate Policy 59-10 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/59-00-minors-and-certificates/#59-10). In addition, at least six credits of the minor must be unique from the prescribed courses required by a student's major(s).

Code	Title	Credits
Prescribed Courses		
Prescribed Courses: Require a grade of C or better		
CHEM 112	Chemical Principles II	3
EGEE 441	Electrochemical Engineering Fundamentals	3
ESC 455	Electrochemical Methods Engineering and Corrosion Science	3
MATH 251	Ordinary and Partial Differential Equations	4
MATSE 421	Corrosion Engineering	3
PHYS 212	General Physics: Electricity and Magnetism	4
Additional Courses		
Additional Courses: Require a grade of C or better		
Select 6 credits of the following:		6
CHE 330	Process Fluid Mechanics	
or ME 300	Engineering Thermodynamics I	
EME 301	Thermodynamics in Energy and Mineral Engineering	
EME 303	Fluid Mechanics in Energy and Mineral Engineering	
or CHE 220	Introduction to Chemical Engineering Thermodynamics	
MATSE 402	Materials Process Kinetics	
ME 320	Fluid Flow	
or MATSE 4(	Thermodynamics of Materials	
Select 9 credits of the following:		9
EGEE 420	Hydrogen and Fuel Cells	
EGEE 436	Modern Thermodynamics for Energy Systems	
EGEE 437	Design of Solar Energy Conversion Systems	
EME 407	Electrochemical Energy Storage	
ME 403	Polymer Electrolyte Fuel Cell Engines	

Student Outcomes

The integration of knowledge and skills acquired through the inquiry-based teaching methods should enable students of the program to achieve the following student educational outcomes:

- solve problems relating to the production, storage, distribution and utilization of electrochemical energy and the associated environmental issues
- design and conduct experiments, acquire data, define, analyze, and interpret data, and solve practical, complex problems on a variety of electrochemical technologies such as batteries, solar cells, flow and fuel cells, electrolyzers, and supercapacitors
- integrate professional, ethical, social and environmental factors in electrochemical engineering design and problem solving and understand the impact of these factors on global energy issues
- develop the ability to communicate effectively in writing and orally and build teamwork
- acquire the desire for lifelong learning to maintain technical competence and keep abreast of new developments in the field.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of

both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/)

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