

The Engineering Sustainability Program (ESP): Integrating Experiential Sustainability Training into Engineering Education

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Background

As climate and sustainability challenges intensify, there is growing urgency to equip engineers with the hands-on skills necessary for implementing green technologies. *Penn Engineering 2030* identifies both sustainability and experiential education as strategic priorities. The Engineering Sustainability Program (ESP) is a proposed framework to address these goals by embedding experiential learning in energy and sustainability courses, thus preparing students to contribute meaningfully to the energy transition and sustainable development.

The Big Idea

Integrate hands-on, experiential sustainability training into engineering courses to equip students with the practical skills needed for addressing real-world energy and environmental challenges.

Why does this matter? While interest in climate and sustainability is high among students, many engineering programs lack practical training opportunities that are critical for career success in clean energy and environmental sectors. ESP closes the green skills gap by offering experiential modules that train students to apply their technical knowledge to real-world problems.

What will you do? ESP is a school-wide framework that provides faculty with funding, lab support, student assistants and pedagogical consultation to create and integrate hands-on modules into new or existing courses in energy and sustainability. It creates a repeatable, scalable model for experiential sustainability education at Penn.

How will you do it? ESP will be piloted in three courses, including a new Renewable Energy Technologies Lab, where students will build and deploy wind-powered battery chargers, and existing courses in water treatment and wind energy. Instructors will receive support from educational labs, teaching experts and summer student assistants. The program aims to expand to at least four new courses annually, with additional faculty already committed.

Impact

ESP empowers students with hands-on experience in sustainability, improving learning outcomes while directly addressing workforce needs. It builds long-term capacity within Penn Engineering to deliver climate-relevant education through structured, supported modules. With growing industry demand for engineers trained in renewable energy, water systems and environmentally friendly technologies, ESP has the potential to become a national model. It aligns with Penn's strategic values and prepares graduates to lead in the transition to a sustainable future.

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