

Master of Engineering: Sustainable Systems Engineering



The University of Wisconsin–Madison’s online Master of Engineering: Sustainable Systems Engineering program focuses on preparing you to understand and apply the policy, science, engineering, and economics of tomorrow’s sustainable energy and resource transformation.

What You Learn

- Apply sustainability principles to engineering practices and renewable/sustainable energy system design
- Gain expertise in the environmental, social and economic aspects of sustainability challenges
- Position yourself to lead sustainability and renewable/sustainable energy project initiatives through your organization and for your clients
- Apply objective, reliable, and cost-effective solutions to sustainability problems through appropriate engineering, valid science, and responsible management

Where & How You Learn

Where Fully online; spring and fall admission

How Complete 9 credits of science and sustainability coursework, 12 credits within the engineering curriculum, and 9 credits of electives. You’ll collaborate with fellow professionals as you progress together through the common curriculum.

Most classes meet online once a week at a defined day/time with additional learning activities that supplement the course delivery; each class is recorded, so you can participate regardless of your travel schedule or location.

The University of Wisconsin-Madison has the right perspective, resources, and people to lead with such a cutting-edge program. Sustainability continues to evolve at a rapid pace and there is incredible value in helping each other learn how it is changing in our respective areas of practice as working professionals.

Matt Metzger, Civil Engineer, Barr Engineering Company

Apply Now!

Visit go.wisc.edu/SSE

At a Glance

Delivery: Online

Credits: 30 graduate credits

Time Frame: 3 years

Tuition: Resident and non-resident:
\$1,300 per credit

Typical Curriculum

- Core Competencies of Sustainability
- Sustainable Approaches to System Improvement
- Energy Resources
- Sustainable Microgrids
- Distributed Renewable Energy System Design
- Energy Efficiency in Buildings
- Sustainable Facilities
- Wind Energy Development and Design
- Sustainable Systems Engineering Capstone

Questions?

For more information on admission requirements, how to apply, tuition and financial aid or other questions, contact:

Graduate Programs Coordinator

608-262-0468

gradadmissions@interpro.wisc.edu



Sample Plan of Study

Year	Course Number	Course Title	Credits
Year 1	Fall 1	EPD660 Core Competencies of Sustainability	3
		EPD702 Professional Presentations	1
	Spring 1	BSE367 Renewable Energy Systems	3
		EP602 Sustainable Energy Challenges	1
	Summer 1	CIVENGR729 Environmental Sustainability Tools	3
EPD785 Effective Negotiations		1	
Year 2			
Fall 2	OTM770 Sustainable Approaches to System Improvement	4	
	OR EPD731 Energy Efficiency in Buildings	3	
Spring 2	GLE535 Wind Energy 3D (Develop, Design, Deliver)	3	
	OR EPD690 Distributed Renewable Energy System Design	3	
Summer 2	EPD690 Sustainable Microgrids	3	
	EPD784 Project Management	1	
Year 3			
Fall 3	EPD730 Sustainable Facilities	3	
	EPD712 Ethics for Professionals	1	
Spring 3	EPD669 SSE Capstone Design	3	
	EPD783 Leading Teams	1	

Course schedule subject to change.

The schedule shown above is one example. Each individual course plan will vary based on starting semester and electives chosen. More electives are available, such as:

- EPD701: Writing for Professionals
- EPD704: Organizational Communication and Problem Solving
- EPD706: Change Management
- EPD708: Creating Breakthrough Innovations

Science and Sustainability Curriculum (minimum 9 credits)

Core Competencies of Sustainability

Gain an introduction to real-world pragmatic skills and applications in sustainability competencies. Content in this course reaches across engineering expertise, from chemical engineering to building design to product design and energy. Course modules cover ecological footprinting, lifecycle assessment, resource use and integrated engineering practice.

Sustainable Approaches to System Improvement

Learn innovative system-improvement concepts and approaches that sustainably strengthen mission-central concerns such as quality, cost, customers, markets, revenue, profit, brand, reputation, sourcing, quality of work life, natural capital, buildup of concentrations and base of the pyramid.

Renewable Energy Systems

Learn about state-of-the-art renewable energy applications, including biomass for heat, electric power and liquid fuels, as well as geo-energy sources such as wind, solar, and hydropower. Perform engineering calculations of power and energy availability of renewable energy sources and learn about requirements for integrating renewable energy sources into production, distribution and end-use systems.

Energy Resources

Develop the ability to explain how resource quality impacts the implementation of renewable and nonrenewable energy systems, and assess the sustainability of natural resources that currently support both systems. You will also evaluate alternative pathways to mitigate the negative consequences of energy uses.

Core Engineering and Design Curriculum (minimum 12 credits)

Energy Efficiency in Buildings

Core principles of energy use in the building sector (residential, commercial, institutional buildings.) Factors that influence energy demand (equipment, controls, usage patterns, operation, maintenance). Concepts of heating and cooling loads, lighting, building envelope performance, IAQ, heat transfer, climate, orientation. Applications to existing building operation and improvement, new building design and planning. Trends toward zero energy buildings.

Sustainable Facilities

Explore the environmental impacts of commercial and residential buildings, including energy, water, materials, transportation, waste, human health, and land use impacts. Learn about improvement opportunities in each phase of a building's life cycle, case studies, benchmarking tools, related public policies and their effectiveness, emerging concepts, and the role of human behavior and innovation in building performance.

Electromechanical Energy Conversion

Energy storage and conversion, force and EMF production, coupled circuit analysis of systems with both electrical and mechanical inputs. Applications to electric motors and generators and other electromechanical transducers. Requires an electrical engineering, or equivalent, undergraduate degree.

Distributed Renewable Energy System Design

Design renewable/sustainable energy (solar, wind, geothermal exchange) for "behind the meter" systems (i.e., distributed energy) for residential, commercial, industrial, and institutional buildings and campuses. Each course segment will include the energy principles at building- and campus-scale. Site evaluation and economics; current technologies; analysis of sizing and installation. Trends in residential and commercial building-integrated systems, market dynamics, policies, and drivers.

Sustainable Microgrids

This course is designed to provide an introduction to integrating various renewable energy resources such as solar, wind and biofuel systems, classical electrical utilities, electrical loads and energy storage systems to form microgrids. The course will provide an overview, modeling and design approaches for each type of energy resource, integration approaches, and operation of microgrids from business and economic perspectives, culminating in a design project at the end of the term.

Wind Energy Development and Design

Science and mechanics component includes turbine basics, wind resource assessment, energy production, and economic return. Balance-of-plant design aspects include site layout and micro-siting, foundation systems, collector systems and interconnection, site civil and electrical infrastructure, and structural tower analysis. Development includes environmental due diligence and permitting, stakeholder engagement, and levelized cost of energy (LCOE).

Sustainable Systems Engineering Capstone (required)

Demonstrate your ability to think globally, sustainably, and creatively. Apply theory, tools, and research to conceptualize, analyze, and design a solution to a problem within a social, engineering, and environmental context. Integrate the tools, science, technical communication and engagement, and design principles acquired during the Sustainable Systems Engineering program.

Flexible Curriculum

**In-Depth, Broad-Ranging,
Technical Knowledge
Start Fall or Spring**

Learn more at go.wisc.edu/SSE

College of Engineering • Interdisciplinary Professional Programs

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