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 and knowledge of the environmental, social and economic aspects, and design interplays of sustainability frameworks and renewable energy systems
- Position yourself to lead and ferment sustainability and renewable/sustainable energy project initiatives through your organization and for your clients
- Develop a stakeholder plan and engage stakeholders in sustainability issues
- 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 6 credits of science and sustainability coursework, 15 credits within the engineering curriculum, and 9 credits of electives. You develop close, supportive relationships with fellow professionals as you progress together through the common curriculum.

Most classes commonly meet online once a week at a defined day/time with recorded lecture modules 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](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
- Building Efficiency
- 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@epd.wisc.edu
Sample Plan of Study

### Core Engineering and Design Curriculum (minimum 15 credits)

#### Building Efficiency
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.

### Science and Sustainability Curriculum (minimum 6 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.

### Flexible Curriculum
In-Depth, Broad-Ranging, Technical Knowledge
Start Fall or Spring
Learn more at go.wisc.edu/SSE

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