Sustainable Energy Engineering
Master of Science

The School of Engineering and Mines offers Master of Science and Master of Engineering degrees in Sustainable Energy Engineering that continue UND’s tradition as a world leader in energy-related research and education. The school also offers the multidisciplinary Engineering Ph.D. program and Environmental Engineering master’s program. The M.S. degree is the most common option in the Sustainable Energy Engineering program and financial aid is provided to the vast majority of students working towards this degree.

The Sustainable Energy Engineering program educates graduate students in the growing field of sustainable energy engineering which includes the environmentally acceptable use of coal; renewable fuels and chemicals; the absorption and conversion of solar energy; the absorption and conversion of wind energy; geothermal energy conversion; hydrogen production, storage, distribution, and utilization; and other technologies. Coursework is designed to help students develop a broad background in the technical, economic, and societal factors needed to develop sustainable energy. Research projects provide focused, experiential learning in areas of sustainable energy engineering. Projects are often conducted through our interdisciplinary Sustainable Energy Research, Infrastructure and Supporting Education (ND SUNRISE) research initiative or in collaboration with the Energy and Environmental Research Center.

Admission Requirements
1. B.S. degree in chemical, mechanical or environmental engineering or related field. Students holding a B.S. degree in a science or an unrelated engineering field may be admitted to Qualified Status with an obligation to acquire background undergraduate engineering knowledge. The exact requirement will be determined on a case-by-case basis.
2. An overall undergraduate GPA of at least 2.75, or 3.00 for the last two years. (An overall GPA of at least 3.3 for the combined BS ChE/MS SEE or combined BS ME/MS SEE degree is required).
3. Graduate Record Examination General only if prerequisite degree is not accredited by ABET.
4. A minimum TOEFL Score of 550 on the paper-based test or 213 on the computer-based test, or for the internet-based TOEFL, a composite score of 79, with minimum scores of 21/30 (Speaking); 19/30 (Listening); 19/30 (Reading); and 17/30 (Writing) for applicants whose native language is not English. Applicants may also meet language requirements by presenting IELTS scores of 6.5. Applicants being considered for Graduate Teaching Assistantships must achieve these minimum TOEFL scores, but have a minimum score of 26/30 on the Speaking subtest. Students who have received a bachelor’s degree or higher from the United States or English-speaking Canada are not required to submit the TOEFL.

Degree Requirements
Thesis Option:
1. A minimum of 30 semester credits, including the credits granted for the thesis and the research leading to the thesis.
2. At least one-half of the credits must be at or above the 500-level.
3. A maximum of nine semester credits may be transferred from another institution.
4. Required Courses:
   - Seminar in Chemical & Sustainable Energy Engineering 2 cr
   - Research 3 cr
   - Thesis 4 cr
   - At least 21 credits of coursework from sustainable energy engineering and related fields, which may include a minor or cognate. 21 cr
5. A thesis documenting work on a topic related to sustainable engineering

Non-Thesis Option:
1. A minimum of 32 semester credits, including credits granted for the independent study project.
2. At least one-half of the credits must be at or above the 500-level.
3. A maximum of nine semester credits may be transferred from another institution.
4. Required Courses:
   - Seminar in Chemical & Sustainable Energy Engineering 2 cr

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Research  4 cr
Independent Study  2 cr
At least 24 credits of coursework from sustainable energy engineering and related fields  24 cr

5. Preparation of a written independent study report approved by the faculty advisor.
6. Passing of a comprehensive final examination.

Faculty and Areas of Expertise

**Steve Benson** (Professor). Research interests: Efficient and clean utilization of renewable and fossil fuels in gasification and combustion systems, ash formation and fireside ash deposition, carbon products, carbon dioxide separation and capture.

**Frank Bowman** (Assistant Professor and Graduate Program Director). Research interests: Atmospheric aerosols, organic aerosol partitioning, mathematical modeling of multicomponent aerosols, air quality modeling, educational technology, assessment of student learning, educational air pollution models.

**Will Gosnold** (Professor and Chair of Geology and Geological Engineering). Research interests: Continental heat flow, borehole paleoclimatology, geothermal energy, heat advection in fluids, tectonics.

**Yun Ji** (Assistant Professor). Research interests: Renewable and sustainable energy, chemicals, and fuels; biomass pretreatment, enzymatic hydrolysis, integrated energy and environmental projects, process simulation, forestry biorefinery, pulp and paper technology.

**Edward Kolodka** (Associate Professor). Research interests: Polymer reaction engineering, synthesis, rheological and mechanical properties of polymers, development of polymers from agricultural products, synthesis and characterization of conducting polymers.

**Gautham Krishnamoorthy** (Assistant Professor). Research interests: Computational fluid dynamics, simulations of combustion reacting flows, carbon capture technologies, radiative heat transfer.

**Michael Mann** (Professor and Chair of Chemical Engineering). Research interests: Advanced energy systems firing coal and biomass, emission control, renewable and sustainable energy systems, coupling thermodynamics with political, social, and economic factors.

**Hossein Salehfar** (Professor). Research interests: Renewable energy systems and components for wind, solar, geothermal, fuel cells; grid integration issues and controls.

**Wayne Seames** (Professor). Research interests: Mitigating the impact of heavy inorganic elements upon the environment, combustion technology, alternative fuels development, biochemical unit operations, environmental impacts from wood and concrete contamination, enhancing the productivity of agricultural processing plants.

**Brian Tande** (Assistant Professor). Research interests: Polymer science and engineering with applications in sustainable energy, rheology of complex fluids, block copolymer morphology, neutron scattering, effect of polymer branching on membrane transport, polymers and composites from renewable sources.

**Bob Wills** (Professor). Research interests: Non-thermal drying of solids by chemical dehydration, vegetative oil extraction, product enhancement and process efficiencies in the fermentation industry.

**Lance Yarbrough** (Assistant Professor). Research interests: coal gasification, remote sensing, GIS Engineering geology, remote sensing, geospatial analysis, subsurface exploration techniques, environmental remediation.

**Zheng-Wen Zeng** (Assistant Professor). Research interests: CO₂ sequestration, CO₂ enhanced oil recovery, underground coal gasification, hydraulic fracturing for enhanced geothermal energy recovery

Program Contact Information

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