The Environmental Engineering graduate program combines those aspects of Chemical, Civil, and Geological Engineering most applicable to environmentally related problems. This program is, to our best knowledge, unique in the combination of these three disciplines for the training of graduate students in environmental engineering. These interdisciplinary M.S., M.Eng., and Certificate programs provide high-quality education and skill development opportunities, preparing students to be professionally successful, to be life-long learners, and to be knowledgeable, contributing members of a multicultural, global society. The faculty of the three participating departments and participating UND Energy and Environmental Research Center (EERC) personnel represent a tremendous wealth of environmental expertise based on past and current field and laboratory research, consulting experience, professional organization involvement, and formal continuing education and technical training. They also have strong working relationships with personnel from a wide variety of industries, municipalities, consulting firms, governmental agencies, and research-funding organizations. These relationships will provide many opportunities for collaboration and research, which will be beneficial to all stakeholders of the programs.

The program is oriented primarily towards a Master of Science (M.S.) degree. A research project, culminating in a master’s thesis is a major part of this program. The program emphasizes a multidisciplinary approach to Environmental Engineering from Chemical, Civil, and Geological perspectives and includes the three major environmental areas relating to the mitigation of environmental impacts from gaseous, liquid, and solid-phase emission sources. Students benefit from the interactions between the proposed programs and the EERC. The EPA-certified laboratories, pilot processes, research specialists, and ongoing research opportunities at the EERC are phenomenal assets.

In addition, a number of on-campus laboratory facilities, including the multi-disciplinary Environmental Analytical Research Laboratory (Leonard Hall), Civil Engineering Environmental and Hydraulics Laboratories, and Chemical Engineering Laboratories are well equipped and fully available to the proposed programs. Enhanced research opportunities and additional analytical laboratory expertise will be available through established off-campus relationships with numerous state agencies, industries, consulting firms and communities.

The mission of the Environmental Engineering Master of Science program is to prepare environmental engineers and environmental engineering scientists for careers in:

1. industry or government, and/or
2. doctoral studies in environmental engineering or related fields.

This preparation will include advanced coursework in the three core disciplines supporting the field of environmental engineering, namely chemical, civil, and geological engineering, plus additional study and research in specific areas of interest to the student and for which the faculty is qualified to direct and instruct.

- **Goal 1**: Students, with the advice of their research advisor and thesis committee, will construct a program of study that meets their individual learning goals and objectives, while fulfilling the qualifications for the M.S. Environmental Engineering degree.
- **Goal 2**: Graduates will be proficient researchers, i.e. they will have the skills required to formulate, assess, and document a hypothesis.
- **Goal 3**: Graduates will be well prepared for a career in industry and/or doctoral studies in environmental engineering or a related field.

### Admission Requirements

The applicant must meet the School of Graduate Studies’ current minimum general admission requirements as published in the graduate catalog.

1. Bachelor of Science degree from an ABET accredited engineering program in Environmental, Chemical, Civil, or Geological Engineering. Students holding a B.S. degree in other engineering disciplines or in a science field may be admitted to Qualified Status with an obligation to acquire background undergraduate engineering knowledge. The exact requirements 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.
3. Graduate Record Examination General Test for applicants from non-ABET accredited programs.
4. Satisfy the School of Graduate Studies' English Language Proficiency requirements as published in the graduate catalog.

Degree Requirements
Students seeking the Master of Science degree at the University of North Dakota must satisfy all general requirements set forth by the School of Graduate Studies' as well as particular requirements set forth by the Environmental Engineering Program.

1. A minimum of 30 semester credits in a major field, 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 eight semester credits may be transferred from another institution.
4. Required Courses:

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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENVE 562</td>
<td>Seminar in Environmental Engineering (1 credit per semester)</td>
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<tr>
<td>ENVE 591</td>
<td>Environmental Engineering Research</td>
<td>3</td>
</tr>
<tr>
<td>CHE 501</td>
<td>Advanced Transport Phenomena</td>
<td>3</td>
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<td>CHE 504</td>
<td>Air Pollution Control</td>
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<td>Transport Of Mass</td>
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<td>CE 531</td>
<td>Environmental Engineering III</td>
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<td>GEOE 417</td>
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<td>Total Credits</td>
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</table>

5. A thesis documenting research conducted on a problem(s) related to Environmental Engineering is required.

Faculty and Areas of Expertise
• Frank Bowman, Chemical Engineering – Atmospheric aerosols, organic aerosol partitioning, mathematical modeling of multicomponent aerosols, air quality modeling, educational technology, assessment of student learning, educational air pollution models.
• Harvey Gullicks, Civil Engineering - Water and Wastewater Treatment and Contaminated Media Remediation.
• Scott Korom, Geological Engineering - Groundwater Remediation, Modeling, Denitrification.
• Gautham Krishnamoorthy, Computational fluid dynamics, simulations of combustion reaction flows, carbon capture technologies, radiative heat transfer.
• Michael Mann, Chemical Engineering - Performance issues in advanced energy systems firing coal and biomass, emission control, renewable energy systems, and the development of energy strategies based on thermodynamics and economics.
• Charles Moretti, Civil Engineering - Environmental Engineering, Water Treatment.
• Wayne Seames, Chemical Engineering - Mitigation of the environmental impact of heavy metals, trace element partitioning from combustion and incineration, alternative fuels development, new products and improved processing of agriculture, biochemical unit operations, environmental impacts from wood and concrete contamination.
• Robert Wills, Non-thermal drying of solids by chemical dehydration, vegetative oil extraction and product enhancement.
• Lance Yarborough, Geological Engineering - Engineering geology, Remote sensing, Geospatial analysis, Environmental remediation.

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