# ENGINEERING SCIENCE (MS) - GEOLOGY & GEOLOGICAL ENGINEERING

## Description

The M.S. in engineering science is offered in a number of emphasis areas: aeroacoustics, biomedical engineering, chemical engineering, civil engineering, computational hydroscience, computer engineering, computer science, electrical engineering, electromagnetics, environmental engineering, geology, geological engineering, hydrology, mechanical engineering, material science and engineering, and telecommunications.

**Minimum Total Credit Hours: 30**

## Course Requirements

A student must complete the requirements for an emphasis area. For most emphasis areas, the degree may be completed as a:

- Thesis option (30-hour program, to include 6 hours of thesis),
- Nonthesis option (30- hour program, to include a minimum of 3 hours of a design-oriented project course), or
- Coursework option (30-hour program, to include a final oral examination in front of a committee, but no written report)

### Emphasis - Environmental Engineering

#### Description

A M.S. in engineering science with emphasis in environmental engineering prepares a student with advanced technical knowledge and communication skills for pursuing a career in industry, engineering research and development, public service, or for doctoral work. Students can concentrate in any of the following specialty areas: water resources, watershed systems, hydrology, surface water quality, stormwater, wastewater, solid waste, air pollution, groundwater modeling and remediation, and remote sensing and geospatial technologies. Students entering the program come from a variety of engineering and nonengineering disciplines, such as geology, chemistry, biology, and mathematics.

#### Goals/Mission Statement

The program will provide high quality graduate education in a range of environmental disciplines and will produce research and scholarship that is nationally recognized and supports the economic development of the state, the region, and the nation.

#### Course Requirements

The M.S. with emphasis in environmental engineering can be completed as either a thesis or nonthesis option. The thesis option requires at least 24 hours of course work and at least 6 hours of thesis credit (ENGR 6997A Thesis) with a thesis defense. The nonthesis option requires 27 hours of course work and a 3-hour project or research course (ENGR 6999F Special Topics in Engineering Science or ENGR 6999D Research Topics in Engineering Science I) with a written report and oral presentation. The graduate course work for either option must include at least one course in mathematics (e.g., ENGR 5411 Engineering Analysis I, MATH 5051 Advanced Calculus I, MATH 5052 Advanced Calculus II, MATH 5351 Mathematical Statistics I), one course in numerical method (e.g., ENGR 5405 Finite Element Analysis I), and one course in mechanics (e.g., ENGR 6170 Continuum Mechanics). Other graduate course work must be approved by the student's adviser.

### Emphasis - Geological Engineering

#### Description

A M.S. in engineering science with emphasis in geological engineering prepares a student with advanced technical knowledge and communication skills for pursuing a career in industry, engineering research and development, public service, or for doctoral work.

#### Course Requirements

The M.S. with emphasis in geological engineering can be completed as either a thesis or nonthesis option. All course selections for both the thesis and nonthesis options must be approved by the student's advisory committee. The thesis option requires a minimum of 6 semester hours of thesis credit. The nonthesis option requires the successful completion of an applied project approved by the student's committee.

#### Other Academic Requirements

For either option, a candidate must pass a final oral examination.

### Emphasis - Geology

#### Description

A M.S. in engineering science with emphasis in geology prepares a student with advanced technical knowledge and communication skills for pursuing a career in industry, research and development, public service, or for doctoral work.

#### Course Requirements

The M.S. with emphasis in geology can be completed as either a thesis or nonthesis option. All course selections for both the thesis and nonthesis options must be approved by the student's advisory committee. The thesis option requires a minimum of 6 semester hours of thesis credit. The nonthesis option requires the successful completion of an applied project approved by the student's committee.

#### Other Academic Requirements

For either option, a candidate must pass a final oral examination.

### Emphasis - Hydrology & Comp Hydroscience

#### Description

An M.S. in engineering science with an emphasis in hydrology and computational hydroscience prepares a student with advanced technical knowledge and communication skills for pursuing a career in industry, engineering research and development, public service, or for doctoral work. This degree is cross-listed between several departments within the School of Engineering. The student's home department is the same as the student's academic adviser's home department. It covers the fields of surface hydrology, groundwater hydrology, computational hydroscience and/or hydraulic engineering.

#### Course Requirements

For the M.S. in engineering science with emphasis in hydrology and computational hydroscience, a student must complete 24 credit hours of coursework (plus at least 6 thesis hours). Graduate coursework must be approved by the student's advisory committee. Below is a full list of recommended courses. In addition to the previously mentioned credit hours, students must enroll in a 1-hour graduate seminar each semester.

Students must choose from this recommended list:

| Code | Title | Hours |
|---|---|---|
| ENGR 5411 | Engineering Analysis I | 3 |
| ENGR 5431 | Approximate Methods of Engr Analysis I | 3 |
| ENGR 6090 | Time Series Analysis | 3 |
| ENGR 6170 | Continuum Mechanics | 3 |
| ENGR 6200 | Advanced Remote Sensing | 3 |
| ENGR 6999A | Adv. Topics in Computational Mechanics | 3 |
| ENGR 6360 | Groundwater Mechanics | 3 |
| ENGR 6370 | Groundwater Modeling | 3 |
| ENGR 7110 | Turbulence | 3 |
| ENGR 5475 | Special Projects in Engineering Science | 1-3 |
| ENGR 5480 | Special Projects in Engineering Science | 1-3 |
| ENGR 6032 | Fluid Dynamics II | 3 |
| ENGR 5235 | Environmental Remediation | 3 |
| ENGR 6450 | Contaminant Transport | 3 |
| ENGR 6180 | Vadose Zone Hydrology | 3 |
| ENGR 6160 | Isotope Hydrogeology | 3 |
| ENGR 6270 | Ray Methods in Electromagnetics | 2-3 |
| MATH 5051 | Advanced Calculus I | 3 |
| MATH 5052 | Advanced Calculus II | 3 |
| MATH 5351/7751 | Mathematical Statistics I | 3 |
| MATH 5352/7752 | Mathematical Statistics II | 3 |
| CIVE 5141 | Flow in Open Channels | 3 |
| CIVE 5172 | Stormwater Engineering and Management | 3 |
| CHME 5000 | Advanced Transport Phenomena I | 3 |
| CHME 5102 | Advanced Transport Phenomena II | 3 |
| GEOL 5000 | Intro. to Geographic Information Systems | 3 |
| GEOL 5050 | Hydrogeology | 4 |
| GEOL 6150 | Geostatistics | 3 |
| GEOE 5100 | Remote Sensing | 3 |
| GEOE 5030 | Environmental Geochemistry | 3 |
| CSCI 5026 | Parallel Computing | 3 |
| CSCI 5047 | Digital Image Processing | 3 |

## Other Academic Requirements

For either option, a candidate must pass a final oral examination.