# ENGINEERING SCIENCE (MS) - ELECTRICAL AND COMPUTER 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 - Computer Engineering

#### Description

An M.S. in engineering science with emphasis in computer 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.

#### General Education Requirements

The M.S. with emphasis in computer 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. Of the 24 hours of course work, 3 to 6 hours can be in an approved minor area, at least 1 hour must be in seminar, and no more than 3 hours can come from research credit outside the thesis.

The nonthesis option requires 27 hours of course work and a 3-hour project or research course with a written report, final oral presentation, and final oral exam. Course work for either option must be approved by the student's advisory committee.

#### Other Academic Requirements

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

### Emphasis - EE (Electromagnetics)

#### Description

An M.S. in engineering science with emphasis in electromagnetics 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 electromagnetics can be taken as a thesis or nonthesis option. Either option requires 10 semester hours of core courses in electromagnetics theory and applications:

| Code | Title | Hours |
|---|---|---|
| ENGR 6260 | Numerical Methods in Electromagnetics | 3 |
| ENGR 7210 | Advanced Electrodynamics | 3 |
| ENGR 7230 | Passive Microwave Circuits | 3 |
| ENGR 6950 | Seminar | 1 |

Also required are 8 semester hours in specific areas of electromagnetics, including microwave circuits, antennas, electromagnetics, and computational electromagnetics courses:

| Code | Title | Hours |
|---|---|---|
| From among: | | |
| ENGR 5405 | Finite Element Analysis I | 3 |
| ENGR 5431 | Approximate Methods of Engr Analysis I | 3 |
| ENGR 6220 | Advanced Electromagnetic Theory | 3 |
| ENGR 6240 | Active Microwave Circuits | 3 |
| ENGR 6270 | Ray Methods in Electromagnetics | 2-3 |
| ENGR 6870 | Special Functions for Applications | 3 |
| ENGR 6999B | Special Topics in Engineering Science I | 1-3 |
| ENGR 6999D | Research Topics in Engineering Science I (no more than 2 semester hours) | 3 |
| ENGR 7190 | Advanced Microwave Measurements | 3 |
| ENGR 7250 | Antennas | 3 |
| ENGR 7280 | Adv Numerical Methods in Electromagnetic | 3 |
| ENGR 6999F | Special Topics in Engineering Science | 1-6 |

For the thesis option, the student must complete 6 hours of electives, including 3 to 6 hours in a minor field. The thesis candidate must take at least 6 hours of thesis.

For the nonthesis option, the student also must complete 9 hours of electives, including 3 to 6 hours as a minor from mathematics, physics, or another area with approval, and technical electives from the areas listed above. The nonthesis candidate also must complete a 3-hour project or research course with written report and oral presentations, and a final oral exam.

#### Other Academic Requirements

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

### Emphasis - Electrical Engineering

#### Description

An M.S. in engineering science with emphasis in electrical 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 electrical 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. Of the 24 hours of course work, 3 to 6 hours can

be in an approved minor area, at least 1 hour must be in seminar, and no more than 3 hours can come from research credit outside the thesis.

The nonthesis option requires 27 hours of course work and a 3-hour project or research course with a written report, final oral presentation, and final oral exam. Course work for either option must be approved by the student's advisory committee.

### Other Academic Requirements
For either option, a candidate must pass a final oral examination.

## Emphasis - Telecommunications
### Description
An M.S. in engineering science with emphasis in telecommunications 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 telecommunications must be completed as a thesis option only. In addition to 6 hours of thesis, 24 hours of course work is required. This typically will include courses in wireless communications, digital communications, communications networking, probabilistic modeling, telecommunications policy, and management information systems. Coursework must be approved by the program director.

### Other Academic Requirements
A candidate must prepare and orally defend a thesis.