UNION
GRADUATE
COLLEGE

# School of Engineering and Computer Science Program Information


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# General Information

## Degrees Offered:

- Master of Science in Computer Science
- Master of Science in Electrical Engineering
- Master of Science in Mechanical Engineering
- Master of Science in Engineering and Management Systems

## 2010-2011 Costs:

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| Application Fee: | $60 |
| Resource Fee: | $350 |
| Tuition Fees: | $2,800/course |
| Accommodations: | $10,000 (approximate) |
| Books & Supplies: | $1,200 (approximate) |

## Mission

Our School of Engineering & Computer Science focuses on advancing fundamentals and applying the practical professional knowledge required by today's rapidly changing industries. Students gain from a flexible multi-disciplinary approach that emphasizes the latest technology and is designed to meet their career goals. Recent programmatic changes have introduced emerging technologies and integration of business skills to meet the evolving technology/business industry needs.

## Degrees

### Master of Science in Computer Science:

The Computer Science program expands the fundamentals and ex;lores advances in computational theory, programming languages, software systems, hardware integration, and information technology.

#### Program Requirements

Nine courses numbered 500 or higher, are required, including CSc 511. Three of the nine courses must come from CSC 571, 572 and 583. Two of the nine courses must be either a project (CSc 594–595) or a thesis (CSc 596–597). Students who have extensive software experience may petition to take other graduate-level courses instead of the project/thesis

requirement. EER530, from the EER department, may also be used toward the degree. The nine courses must include a course from each of the core areas:

- Computational theory CSc 512
- Programming languages CSc 513
- Software systems CSc 510, CSc 516
- Hardware systems CSc 518, CSc 552

In addition to the nine courses, all candidates are required to participate in the MS Graduate Seminar in Computer Science (CSc 599). This non-credit seminar serves as the capstone experience of the MS in Computer Science degree. It is normally taken in the last year of the candidate's program.

## Master of Science in Electrical Engineering:

The Electrical Engineering program explores technologies and related industry opportunities in modern electric machinery, modeling and control of power electronics, telecommunications, optics and image processing, and the continuing evolution of software and networks. Strong emphasis is placed on Power Electronics/Energy Conversion and related technologies.

### Program Requirements

A minimum of ten graduate courses and an MS Graduate Project in Electrical Engineering are required. Each student's program should include at least seven electrical engineering courses and up to three electives. Each student should, in conference with the graduate advisor, plan a complete graduate program prior to taking any courses for graduate credit. Students with weak backgrounds may need to take more than ten courses.

Electives should normally be chosen from graduate level courses in electrical engineering, computer science, mechanical engineering, and MBA programs. The advisor must approve every course taken for graduate credit. A thesis could be considered as one or two technical electives.

All candidates not completing a thesis or independent study are required to participate in the MS Graduate Project in Electrical Engineering. This is a non-credit, no-fee project that serves as the culminating experience of the MS in Electrical Engineering degree.

## Master of Science in Mechanical Engineering:

The Mechanical Engineering program expands graduates' understanding and application of solid mechanics, thermal-fluid systems, materials, and manufacturability to advance career opportunities in power systems, emerging energy technologies, and product design evolution. Students are encouraged to consider MBA electrics and several technical courses integrate business skills to complement technical expertise.

### Program Requirements

The MSME requires a total of ten courses. Two of three core courses must be taken by all students: MER 502 (Engineering Analysis) is required by all students and one or both of the following: MER 501 (Transport Phenomena) or MER 500 (Elasticity). Of the remaining eight courses, six must be in the mechanical engineering major. The remaining two courses are selected from engineering (mechanical or electrical), computer science, mathematics, or from the MBA program. Not all courses from these areas are satisfactory selections; therefore all course selections must be approved by the graduate advisor before course registration. Each student must submit a program plan of study (to be approved by the advisor) before completion of the first course taken for graduate credit.

Students can complete the degree by taking ten courses and the MS Graduate Project in Mechanical Engineering noted below. They also have the option of replacing one or two courses with independent research conducted in the form of a Master's Project (one or two courses) or a thesis (two courses) with departmental approval. All students, either part-time or full-time, intending to do Research and Thesis must consult the department for appropriate guidance. Part-time students not completing a Master's Project, thesis, or independent study are required to complete an MS Graduate Project in Mechanical Engineering. This is a non-credit, no-fee project that serves as the culminating experience of the MS in Mechanical Engineering degree.

## Master of Science in Engineering and Management Systems:

The engineering and computer science professions continue to require the understanding and application of broadening technologies that complement each other in their product, system, or service application. Course offerings from all three disciplines (Electrical Engineering, Mechanical Engineering, Computer Science) may be required to provide a student with their desired technical growth or parallel the direction of their industrial interests. Technical career growth may be additionally enhanced by supplementing strong technical fundamentals with management disciplines such as finance, marketing, operations, or other related business skills. The Master of Science in Engineering and Management Systems provides a balanced degree program of engineering and computer science complimented by courses from the School of Management.

**Program Requirements**

A minimum of eleven (11) graduate courses are required. Each student's program should include at least 6 courses from the School of Engineering and Computer Science and 5 courses from the School of Management. Each student should, in conference with their graduate advisor, plan a complete graduate program prior to taking any courses for graduate credit. Students with weak backgrounds may need to take more than eleven (11) courses. The student's advisor should approve every course taken for graduate credit toward this degree.

Graduate courses taken from the School of Engineering and Computer Science should be selected from the following:

- Mechanical Engineering - credit bearing Mechanical Engineering courses
- Electrical Engineering - credit bearing Electrical Engineering courses
- Computer Science - credit bearing Computer Science courses of which 1 of 2 or 3, 2 of 4 or 5, or 3 of 6 must come from CSc 560, 561, 562, 563, 571, 572, 583 or MBA 641, 642, 643. If only 1 Computer Science course is taken, it may be any credit- bearing course.

Graduate courses taken from the School of Management should be selected from those credit bearing courses numbered MBA-510 and above unless otherwise approved. The following courses are also acceptable to meet the five business courses (MER/EER 602, MER/EER 600).

The Master of Science in Engineering and Management Systems Program will not allow graduate work from another institution to be transferred toward completion of this degree program per the existing transfer policy noted elsewhere in this catalog. This program is focused at providing the working professional or new graduate student the opportunity to integrate curriculum from each of the School of Engineering and Computer Science and School of Management disciplines to focus on a career or industry objective. As such, reducing the core engineering and computer science requirements by allowing prior transfer courses is not consistent with the objective of the curriculum or the degree. During completion of the degree requirements a candidate may obtain agreement to take a graduate course from another institution and apply it to this degree as part of their approved course selection such as a nano engineering course from SUNY Albany.

# MS Degree Requirements in Engineering and Computer Science

| MS Program Required? | MS Thesis | MS Project or Independent Study | Core Program Required? | Remaining Program | Capstone Experience |
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| **Computer Science**<br>Nine courses required | The student must choose from one of the following:<br>**1.** Complete a two-course thesis<br>**2.** Complete a two-course independent programming project<br>**3.** Substitute two courses with faculty approval. | | **Yes,** CSc511 as part of nine courses. | The nine courses must include one course from each of these four areas:<br>1. Computational theory<br>2. Programming languages<br>3. Software systems<br>4. Hardware systems<br><br>Three courses from the following:<br>CSC 571, 572, and 583. | **The MS Graduate Seminar in Computer Science*:**<br>A regularly scheduled seminar in which all candidates participate in a discussion of current topics in Computer Science. |
| **Electrical Engineering**<br>Ten courses required | Not required, but if the student elects to do a thesis, it counts as one or two technical electives. | Not required, but if the student elects to do an independent study, it counts as one technical elective. | No | Minimum of seven EE courses and up to three electives. | **The MS in Electrical Engineering Culminating Experience:** The candidate must choose one of the following: Thesis, Independent Study, Masters Project, or MS Graduate Project* approved by the faculty advisor. |
| **Mechanical Engineering**<br>Ten courses required | Required for full-time students. Not required of part-time students but, if selected, thesis counts as two technical electives. | Not required, but if student elects to do independent MS project, it counts as one course. | **Yes**, two core courses:<br>MER 502 (Engineering Analysis), is required<br>MER 501 (Transport Phenomena) and/or MER 500 (Elasticity) | Six ME courses plus two electives. | **The MS in Mechanical Engineering Culminating Experience:** The candidate must complete either a thesis, Independent Study, Masters Project or MS Graduate Project* approved by the faculty advisor. |
| **Engineering and Management Systems**<br>Eleven courses required | Not required | Not required | No | Six courses from the School of Engineering and Computer Science<br><br>Five courses from the School of Management | Not required |

*MS Graduate Seminar and MS Graduate Project are no-fee, no-credit course listings.