MECHANICAL AND NUCLEAR ENGINEERING, MASTER OF SCIENCE (M.S.)

Program mission

The mission of the M.S. in Mechanical and Nuclear Engineering degree is to provide graduate students with learning opportunities for acquiring a broad foundation of engineering knowledge including business and manufacturing aspects; an in-depth research experience at the frontiers of engineering; and skills for lifelong learning and professional development. Graduates of this program will pursue careers in business/industry and government, or will pursue doctoral degrees.

1. Advanced technical skills: To produce graduates who possess the necessary advanced analytical and technical skills in engineering and sciences – responds directly to the higher goals of fulfilling the needs of industry for effective, productive engineers and of providing economic development for the region, state and nation
2. Advanced problem-solving: To produce graduates who demonstrate creativity and innovation in solving technological problems – stems from the realization that new knowledge and new solutions to existing problems are necessary to meet the needs of our changing society and to advance the quality of human life

Student learning outcomes

1. Apply advanced knowledge of mathematics, science or engineering: Graduates will demonstrate an ability to apply advanced knowledge of mathematics, science or engineering.
2. Identify, formulate and solve engineering problems: Graduates will demonstrate an ability to identify, formulate and solve engineering problems.

VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the Graduate School website (http://www.grad.vcu.edu/) and academic regulations in individual school and department publications and on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

Visit the academic regulations section for additional information on academic regulations for graduate students. (http://bulletin.vcu.edu/academic-reg/)
emerging technologies in mechanical and nuclear engineering. Research
thrusts in the department include but are not limited to smart materials,
micro/nanotechnology, energy conversion systems, sensors, aerosol
science, nuclear engineering, fluid mechanics, medical devices, robotics
and biomechanics.

The M.S. degree program offers a thesis or non-thesis option and can be
tailored to meet the individual student's academic goals and research
interests. Eighteen to 24 months of full-time study usually are necessary
to complete the requirements for the thesis-option. The non-thesis option
generally requires 12 months of full-time study or up to four years of part-
time study. A time limit of six calendar years, beginning at the time of first
registration, is placed on work to be credited toward the master's degree.
Generally, a maximum of six credit hours of approved graduate course
work required for a master's degree may be transferred from another
program at VCU or outside institution and applied toward the degree.

The following are the minimum credit hour requirements for the proposed
graduate degree program options:

**M.S. thesis option** – minimum 30 credit hours including nine credit
hours in core courses, 15 credit hours in technical electives (engineering,
science or related areas) and six credit hours in directed research
EGMN 697

**M.S. non-thesis option** – minimum 30 credit hours including nine
credit hours in core courses and 21 credit hours in technical electives
(engineering, science or approved courses)

The mechanical and nuclear engineering M.S. degree program contains
three curricular components:

1. **Core component:** This component consists of three required core
courses that provide the foundation of the M.S. curriculum. See
below for specific course requirements.
2. **Technical elective component:** This component allows the student
to take courses in either engineering, science or other areas with
approval of the student’s adviser and graduate program director.
3. **Directed research component:** This component emphasizes research
directed toward completion of M.S. degree requirements under the
direction of an adviser and thesis committee.

Depending on the option pursued, students will have to take courses from
two or all three of the curricular components. Students should select
their concentration component courses based upon their concentration
areas. Selecting one concentration area over another does not preclude a
student from choosing courses from other areas.

**Curriculum requirements**

**Core requirements**

All full-time thesis master's students must register for and attend at least
one semester of EGMN 690. Part-time and non-thesis students are not
required to register for the seminar, but they are encouraged to attend.

**Thesis option**

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Core courses, seminar and directed research</td>
<td></td>
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</tr>
<tr>
<td>EGMN 605</td>
<td>Mechanical and Nuclear Engineering Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EGMN 606</td>
<td>Mechanical and Nuclear Engineering Continuum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>EGMN 610</td>
<td>Topics in Nuclear Engineering</td>
<td>3</td>
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**Technical elective courses**

With the approval of the adviser or graduate program director,
select 15 credit hours of courses with the following subject areas:
EGMN, EGRM, ENGR, EGRN, EGRB, EGRE, CLSE, CMSC, PHYS, MATH, NANO, CHEM, BIOL, GRAD, LFSC, OVPR.

**Directed research**

<table>
<thead>
<tr>
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<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EGMN 697</td>
<td>Directed Research in Mechanical and Nuclear Engineering</td>
<td>6</td>
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</tbody>
</table>

**Total Hours**

30

The minimum number of graduate credit hours required for this degree is 30.

**Non-thesis option**

<table>
<thead>
<tr>
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<td>3</td>
</tr>
</tbody>
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**Technical elective courses**

With the approval of the adviser or graduate program director,
select 21 credit hours of courses from the following subject areas:
EGMN, EGRM, ENGR, EGRN, EGRB, EGRE, CLSE, CMSC, PHYS, MATH, NANO, CHEM, BIOL, GRAD, LFSC, OVPR.

**Total Hours**

30

The minimum number of graduate credit hours required for this degree is 30.

**Accelerated opportunities**

The department offers opportunities for qualified undergraduate students
to earn both an undergraduate and graduate degree in a minimum of
five years by completing approved graduate courses during the senior
year of their undergraduate program. See the individual program page for
centrations in the Undergraduate Bulletin for details.

- B.S. in Biomedical Engineering and M.S. in Mechanical and Nuclear Engineering (http://bulletin.vcu.edu/undergraduate/engineering/biomedical-engineering/biomedical-engineering-bs/#acceleratedbsandmsmechanicalandnuclearengineeringtext)
- B.S. in Mechanical Engineering and M.S. in Mechanical and Nuclear Engineering (http://bulletin.vcu.edu/undergraduate/engineering/mechanical-nuclear-engineering/mechanical-engineering-bs/#acceleratedbsandmstext)

**Contact**

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**Program website:** mechanical-and-nuclear.egr.vcu.edu/academics/graduate (https://egr.vcu.edu/departments/mechanical/academics/graduate/)