

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.graduate.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. (<https://bulletin.vcu.edu/academic-regs/>)

Degree candidacy requirements

A graduate student admitted to a program or concentration requiring a final research project, work of art, thesis or dissertation, must qualify for continuing master's or doctoral status according to the degree candidacy requirements of the student's graduate program. Admission to degree candidacy, if applicable, is a formal statement by the graduate student's faculty regarding the student's academic achievements and the student's readiness to proceed to the final research phase of the degree program.

Graduate students and program directors should refer to the following degree candidacy policy as published in the VCU Graduate Bulletin for complete information and instructions.

Visit the academic regulations section for additional information on degree candidacy requirements. (<https://bulletin.vcu.edu/academic-regs/grad/candidacy/>)

Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the academic regulations section for additional information on graduation requirements. (<https://bulletin.vcu.edu/academic-regs/grad/graduation-info/>)

Other information

Student handbook (<http://www.egr.vcu.edu/current-students/graduate-student-services/resources-forms/>) is available on the College of Engineering website.

Apply online today. (<https://www.vcu.edu/admissions/apply/graduate/>)

Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
M.S.	Fall (preferred)	Jan 15	GRE-not required
	Spring	Oct 1	TOEFL required for international students

In addition to the general admission requirements of the VCU Graduate School (<https://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/>) and the College of Engineering, applicants to the mechanical and nuclear engineering degree must have a B.S. degree in mechanical engineering, nuclear engineering or a closely related discipline.

Degree requirements

In addition to the VCU Graduate School graduation requirements (<https://bulletin.vcu.edu/academic-regs/grad/graduation-info/>), students must meet the following requirements.

The Master of Science in Mechanical and Nuclear Engineering program utilizes the faculty and research facilities of the Department of Mechanical and Nuclear Engineering to expose students to advanced and

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 master's students are encouraged to attend seminar EGMN 690. Students are not required to register for the seminar.

Thesis option

Course	Title	Hours
Core courses and directed research		
EGMN 605	Mechanical and Nuclear Engineering Analysis	3
EGMN 606	Mechanical and Nuclear Engineering Continuum Mechanics	3
EGMN 610	Topics in Nuclear Engineering	3

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.	15
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Directed research

EGMN 697	Directed Research in Mechanical and Nuclear Engineering	6
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Total Hours 30

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

Non-thesis option

Course	Title	Hours
Core courses and directed research		
EGMN 605	Mechanical and Nuclear Engineering Analysis	3
EGMN 606	Mechanical and Nuclear Engineering Continuum Mechanics	3
EGMN 610	Topics in Nuclear Engineering	3

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.	21
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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 concentrations in the Undergraduate Bulletin for details.

- B.S. in Biomedical Engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/biomedical-engineering/biomedical-engineering-bs/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Chemical and Life Science Engineering with a concentration in chemical engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/chemical-life-science-engineering/chemical-life-science-engineering-bs-concentration-chemical-engineering/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Chemical and Life Science Engineering with a concentration in life science engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/chemical-life-science-engineering/chemical-life-science-engineering-bs-concentration-life-science-engineering/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Computer Engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/electrical-computer-engineering/computer-engineering-bs/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Computer Science and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/>)

engineering/computer-science/computer-science-bs/
#acceleratedbsandmsmechanicalandnuclearengineeringtext)

- B.S. in Computer Science with a concentration in cybersecurity and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/computer-science/computer-science-bs-concentration-cybersecurity/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Computer Science with a concentration in data science and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/computer-science/computer-science-bs-concentration-data-science/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Computer Science with a concentration in software engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/computer-science/computer-science-bs-concentration-software-engineering/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Electrical Engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/electrical-computer-engineering/electrical-engineering-bs/#acceleratedbsandmsmechanicalandnuclearengineeringtext>)
- B.S. in Mechanical Engineering and M.S. in Mechanical and Nuclear Engineering (<https://bulletin.vcu.edu/undergraduate/engineering/mechanical-nuclear-engineering/mechanical-engineering-bs/#acceleratedbsandmstext>)
- B.S. in Mechanical Engineering with a concentration in nuclear engineering and M.S. in Mechanical and Nuclear Engineering (https://bulletin.vcu.edu/undergraduate/engineering/mechanical-nuclear-engineering/mechanical-engineering_bs-concentration-nuclear-engineering/)

Contact

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Program website: egr.vcu.edu/future-students/graduate/graduate-degrees/mechanical-and-nuclear-engineering-masters/ (<https://egr.vcu.edu/future-students/graduate/graduate-degrees/mechanical-and-nuclear-engineering-masters/>)