NUCLEAR ENGINEERING AND ENGINEERING PHYSICS, M.S.

A broad program of instruction and research is offered in the principles of the interaction of radiation with matter and their applications, and in several areas of engineering physics. The program has strong engineering and applied science components. It emphasizes several areas of activity, including the research, design, development, and deployment of fission reactors; fusion engineering; plasma physics; radiation damage to materials; applied superconductivity and cryogenics; and large-scale computing in engineering science.

The master’s degree may be pursued as a terminal degree in the fission area and in various engineering physics areas, but it is not generally recommended as a final degree in fusion research; students interested in fusion should plan to pursue the Ph.D. degree. About 40 percent of the current graduate students hold undergraduate degrees in nuclear engineering, about 40 percent in physics, and about 20 percent in other disciplines such as mechanical engineering, electrical engineering, mathematics, and materials science.

The department is considered to have one of the top five nuclear engineering programs in the nation over the last 40 years. It incorporates several research organizations including the Wisconsin Institute of Nuclear Systems, the Pegasus Toroidal Experiment Program, the Fusion Technology Institute, and the Center for Plasma Theory and Computation.

Research may be performed in areas including next generation fission reactor engineering; fluid and heat transfer modeling for transient analysis; reactor monitoring and diagnostics; fuel cycle analysis; magnetic and inertial confinement fusion reactor engineering, including the physics of burning plasmas, plasma-wall interactions, neutron transport, tritium breeding, radiation damage, and liquid-metal heat transfer; experimental and theoretical studies of plasmas including radio frequency heating, magnetic confinement, plasma instabilities, and plasma diagnostics; superconducting magnets and cryogenics; and theoretical and experimental studies of the damage to materials in fission and fusion reactors.

The department places considerable emphasis on establishing research teams or group research, as well as traditional research activity by individual faculty members and their students. The groups frequently involve faculty, scientific staff, and graduate students from several departments, adding a strong interdisciplinary flavor to the research.

Students sometimes perform thesis work at national laboratories such as Argonne National Laboratory, Idaho National Laboratory, Princeton Plasma Physics Laboratory, and Los Alamos National Laboratory.

GRADUATE SCHOOL ADMISSIONS

Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/admissions).

REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Deadline</td>
<td>December 15</td>
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<tr>
<td>Spring Deadline</td>
<td>October 1</td>
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<tr>
<td>Summer Deadline</td>
<td>December 15</td>
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<tr>
<td>GRE (Graduate Record Examinations)</td>
<td>Required.*</td>
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<tr>
<td>English Proficiency Test</td>
<td>Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (<a href="https://grad.wisc.edu/apply/requirements/#english-proficiency">https://grad.wisc.edu/apply/requirements/#english-proficiency</a>).</td>
</tr>
</tbody>
</table>

Other Test(s) (e.g., GMAT, MCAT) | n/a |
| Letters of Recommendation | Required |

* Except for current UW-Madison NE/EP/EMA undergraduate students.

The Graduate School sets minimum requirements for admissions. (https://grad.wisc.edu/admissions/requirements) Academic program admission requirements are often more rigorous than those set by the Graduate School. Please check the program website (https://www.engr.wisc.edu/department/engineering-physics/academics/ms-nuclear-engineering) for details and admissions deadlines.

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

PROGRAM RESOURCES

Admission and funding are separate decisions. Not all admitted students are offered support. International applicants must secure a research assistantship, teaching assistantship, fellowship, or independent funding before admission is final. A portion of the top domestic applicants is invited to visit Madison in March. The funding for RAs comes from faculty research grants. Each professor decides on his or her own RA offers. Funded students are expected to maintain full time enrollment. See the program website (https://www.engr.wisc.edu/department/engineering-physics/academics/ms-nuclear-engineering) for additional information.

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/policiesandrequirementstext), in addition to the program requirements listed below.
**MAJOR REQUIREMENTS**

**MODE OF INSTRUCTION**

Mode of Instruction Definitions

- **Face to Face:** These programs are offered in a traditional classroom setting to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

- **Online:** These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

- **Hybrid:** These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

- **Accelerated:** These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

**CURRICULAR REQUIREMENTS**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Minimum Credit Requirement</th>
<th>Guided Endorsement Credit Requirement</th>
<th>Other Requirements</th>
</tr>
</thead>
</table>
| Requirements Detail | 30 credits of technical coursework approved by the student’s faculty advisor | 16 credits | Courses in which grades of BC, C, or below are received cannot be counted toward the degree except as follows: 1) Credits of C will be allowed provided they are balanced by twice as many credits of A or by four times as many credits of AB, 2) Credits of BC will be allowed provided they are balanced by twice as many credits of AB or by an equal number of credits of A.

**GRADUATE SCHOOL POLICIES**

The Graduate School’s Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

**MAJOR-SPECIFIC POLICIES**

**GRADUATE PROGRAM HANDBOOK**

The Graduate Program Handbook (https://www.engr.wisc.edu/department/engineering-physics/academics/ms-nuclear-engineering) is the repository for all of the program’s policies and requirements.
PRIOR COURSEWORK

Graduate Work from Other Institutions
With program approval, students are allowed to count no more than 6 credits of graduate coursework from other institutions toward the minimum graduate degree credit requirement and the minimum graduate coursework (50%) requirement. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

UW–Madison Undergraduate
With faculty approval, students who have received their undergraduate degree from UW–Madison may apply up to 7 credits numbered 400 or above toward the minimum graduate degree credit requirement. This work would not be allowed to count toward the 50% graduate coursework minimum unless taken at the 700 level or above. No credits can be counted toward the minimum graduate residence credit requirement. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

UW–Madison University Special
With program approval, students are allowed to count up to 15 credits of coursework numbered 400 or above taken as a UW–Madison Special student toward the minimum graduate residence credit requirement and the minimum graduate degree credit requirement. UW–Madison coursework taken as a University Special student would not be allowed to count toward the 50% graduate coursework minimum unless taken at the 700 level or above. Coursework earned five or more years prior to admission to a master’s is not allowed to satisfy requirements.

PROBATION
A semester GPA below 3.0 will result in the student being placed on academic probation. If a semester GPA of 3.0 is not attained during the subsequent semester of full time enrollment (or 12 credits of enrollment if enrolled part-time) the student may be dismissed from the program or allowed to continue for one additional semester based on advisor appeal to the Graduate School.

ADVISOR / COMMITTEE
Each student is required to meet with his or her advisor prior to registration every semester.

CREDITS PER TERM ALLOWED
15 credits

TIME CONSTRAINTS
Candidates must pass an oral examination on completed coursework or on the thesis if the thesis option is chosen. Students have two attempts to pass this examination with at least one month elapsing between attempts. Candidates who have passed the

PhD qualifying examination will be excused from the oral master’s examination.

OTHER
n/a

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES
Take advantage of the Graduate School’s professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES
1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
4. Recognize and apply principles of ethical and professional conduct.

PEOPLE

FACULTY

PROFESSORS
Blanchard, Bonazza, Bronkhorst, Crone, Hegna, Henderson, Lakes, Schmitz, Smith, Sovinec, Waleffe, Wilson (chair)

ASSOCIATE PROFESSORS
Allen, Witt

ASSISTANT PROFESSORS
Choy, Couet, Geiger, Franck, Notbohm, Thevamaran

AFFILIATE PROFESSORS
Bednarz, Bier, Engle, Graham, Kolkowitz, Ludois, Ma, Miller, Morgan, Nellis, Pfotenhauer, Porter, Prabha kar, Robertson, Szlufarska, Thomadsen, Trujillo, Vanderby

EMERITUS PROFESSORS
Abdel-Khalik, Bisognano, Callen, Carbon, Conrad, Cook, Corradini, DeLuca, Drugan, Emmert, Fonck, Hershkowitz, Kammer, Kulcinski, Mackie, Malikus, Moses, Plesha, Sandor, Schlack, Vogelsang