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.

ADMISSIONS

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.

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).

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 are 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.

REQUIREMENTS

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

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Evening/Weekend: These programs are offered in an evening and/or weekend format 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

Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 of the required 30 credits must be in graduate-level coursework from nuclear engineering, math, physics, chemistry, computer science, or any other engineering department except E P D; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide (https://registrar.wisc.edu/course-guide/).
Overall Graduate GPA Requirement	3.00 GPA required.
Other Grade Requirements	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.
Assessments and Examinations	Students who do not complete a thesis must pass an oral exam. Students who complete a thesis must defend it orally in front of a committee of three faculty members.
Language Requirements	No language requirements.

REQUIRED COURSES

The following courses, or courses with similar material content, must be taken prior to or during the course of study: N E 427 Nuclear Instrumentation Laboratory; N E 428 Nuclear Reactor Laboratory or N E 526 Laboratory Course in Plasmas; N E 408 Ionizing Radiation or N E/MED PHYS 569 Health Physics and Biological Effects.

Thesis track[1]: maximum of 12 credits for thesis; at least 8 credits of N E courses 400 level or above; remaining credits (also 400 level or above) must be in appropriate technical areas; at least 9 credits must be 500 level and above; up to 3 credits can be seminar credits.

Non-Thesis track[1]: at least 15 credits of N E courses at the 400 level or above; remaining 15 credits (also 400 level or above) must be in appropriate technical areas; at least 12 credits must be at the 500 level or above; up to 3 credits can be seminar credits.

For both the thesis and non-thesis options, only one course (maximum of 3 credits) of independent study (N E 699 Advanced Independent Study, N E 999 Advanced Independent Study) is allowed.

[1] These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

POLICIES

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/app/uploads/2017/09/NEEP-GradGuide_Fall2017_final_wqual.pdf) 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.

With faculty approval, students who have received an ABET-accredited undergraduate degree (not including UW–Madison) may be eligible to apply up to 7 credits of their undergraduate coursework toward the Minimum Graduate Degree Credit Requirement. No credits can be counted toward the Minimum Graduate Residence Credit Requirement, nor 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 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 Ph.D. qualifying examination will be excused from the oral master's examination.

OTHER

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 are invited to visit Madison in March. The funding for RAs comes from faculty research grants. Each professor decides on their own RA offers. Funded students are expected to maintain full time enrollment.

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 solve advanced engineering problems.

3. Demonstrate creative, independent problem solving skills.

4. Apply the latest scientific and technological advancements, advanced techniques, and modern engineering tools to these problems.

5. Recognize and apply principles of ethical and professional conduct.

PEOPLE

Faculty: Professors T. Allen, Blanchard, Bonazza, Crone, Fonck, Hegna, Henderson (chair), Lakes, Smith, Sovinec, Waleffe, Wilson; Associate Professors M. Allen, Schmitz, Witt; Assistant Professors Couet, Notbohm, Scarlat, Thevamaran; Affiliate Professors Bednarz, Bier, Graham, Ludois, Ma, Miller, Morgan, Nellis, Pfotenhauer, Porter, Prabhakar, Robertson, Szlufarska, Thomadsen, Trujillo, Vanderby; Emeritus Professors Abdel-Khalik, Bisognano, Callen, Carbon, Conrad, Cook, Corradini, DeLuca, Drugan, Emmert, Hershkowitz, Kammer, Kulcinski, Mackie, Malkus, Moses, Plesha, Sandor, Schlack, Vogelsang