NUCLEAR ENGINEERING AND ENGINEERING PHYSICS, MS

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; 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 PhD 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 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 and at international research facilities such as the Max-Planck Institute for Plasma Physics.

ADMISSIONS

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

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

Requirements	Detail
Fall Deadline	December 15
Spring Deadline	September 1
Summer Deadline	December 15
GRE (Graduate Record Examinations)	Not required but may be considered if available.*
English Proficiency Test	Every applicant whose native language is not English, or whose undergraduate instruction was not exclusively in English, must provide an English proficiency test score earned within two years of the anticipated term of enrollment. Refer to the Graduate School: Minimum Requirements for Admission policy: https://policy.wisc.edu/library/UW-1241 (https://policy.wisc.edu/library/UW-1241/).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

* GRE scores are optional. Applicants may submit GRE scores, but are not required to do so. Applications without scores are not placed at a disadvantage. However, received scores will be considered as part of our holistic evaluation of applications.

APPLICATION REQUIREMENTS AND PROCESS

Degree

For admission to graduate study in Nuclear Engineering and Engineering Physics, an applicant must have a bachelor's degree in engineering, mathematics, or physical science, and an undergraduate record that indicates an ability to successfully pursue graduate study. International applicants must have a degree comparable to a regionally accredited US bachelor's degree. All applicants must satisfy requirements that are set forth by the Graduate School (https://grad.wisc.edu/apply/requirements/).

It is highly recommended that students take courses that cover the same material as these UW-Madison courses before entering the program:

Code	Title	Credits
Differential Equations		**3**
MATH 319	Techniques in Ordinary Differential Equations	
or MATH 320	Linear Algebra and Differential Equations	
Advanced Mathematics		**3**
MATH 321	Applied Mathematical Analysis	
Nuclear Physics		**3**
N E 305	Fundamentals of Nuclear Engineering	
Materials Science, Metallurgy, or Solid-State Physics		**3**
M S & E 350	Introduction to Materials Science	
or M S & E 351	Materials Science-Structure and Property Relations in Solids	
Heat Transfer or Fluid Mechanics		**3**
CBE 320	Introductory Transport Phenomena	
Mechanics		**3**
PHYSICS 311	Mechanics	
or E M A 202	Dynamics	

Descriptions of course content can be accessed through Guide (http://guide.wisc.edu/courses/). Applicants may enter without having taken these courses. However, in such cases, the applicants must inform their advisors, who will help them plan courses of study that will provide adequate background for our department's graduate curriculum.

GPA

The Graduate School requires a minimum undergraduate grade point average of 3.0 on a 4.0 basis on the equivalent of the last 60 semester hours from the most recent bachelor's degree. In special cases, applicants with grade point averages lower than 3.0 who meet all the general requirements of the Graduate School may be considered for admission on probation.

Advisor Selection Process

MS applicants who intend to complete a thesis are encouraged to identify potential faculty advisors and seek a confirmation. Review the department Research (https://engineering.wisc.edu/departments/nuclear-engineering-engineering-physics/research/) and People (https://directory.engr.wisc.edu/neep/faculty/) websites and contact those whose research interests align with yours. Only faculty members listed with the titles of Assistant Professor, Associate Professor, or Professor, can serve as graduate advisors. Do not contact Emeritus faculty, Lecturers, Research Scientists, or Faculty Associates. You are also encouraged to inquire about possible funding opportunities. If a faculty member agrees to be your advisor, ask the person to email an acknowledgment to neepgradadmission@engr.wisc.edu.

MS applicants who intend to do a course work only degree will be assigned a faculty advisor after admission.

APPLICATION MATERIALS

Each application must include the following:

- Graduate School Application (https://grad.wisc.edu/apply/)
- Academic transcripts
- Statement of purpose
- Resume/CV
- Three letters of recommendation
- GRE Scores **(optional - see below for additional information)**
- English proficiency score **(if required)**
- Application fee

Academic Transcript

Within the online application, upload the undergraduate transcript(s) and, if applicable, the previous graduate transcript. Unofficial copies of transcripts are required for review, but official copies are required for admitted applicants. Do not send transcripts or any other application materials to the Graduate School or the Nuclear Engineering and Engineering Physics department unless requested. Please review the requirements set by the Graduate School (https://grad.wisc.edu/apply/requirements/) for additional information about degrees/transcripts.

Statement of Purpose

The University of Wisconsin-Madison Graduate School and the Department of Nuclear Engineering & Engineering Physics have the following guidelines for the Statement of Purpose:

- Be specific about your interest and knowledge particular to this program:
  - Have you read an article by one or more faculty members?
  - Has your advisor specifically directed you to this program?
  - Do you have other ties to this program and/or school?
- Pick out the pertinent facts about your academic and professional interests that make you a good fit with the program and institution to which you are applying. (A statement of purpose is not a place to list everything you have done.)
- Describe research experiences regardless of whether they are related to your current interests.
- Being self-motivated, curiosity-driven, and goal-oriented are important qualities for aspiring PhDs in Nuclear Engineering and Engineering Physics. To provide evidence of these qualities, you may write about relevant experiences you have had.
- Perseverance and the ability to overcome adversity are also important. Again, discuss relevant experiences you may have to provide evidence.
- Mention extra-curricular achievements to illustrate additional dimensions of your personality.
- Explain (briefly) any incongruity in your application material, such as a low semester grade.
- Our page limit is two and a half pages, but there is no obligation to write long statements.

For more information from the Graduate School, please review their webpage (https://grad.wisc.edu/apply/prepare/).

Resume

Upload your resume in your application.

Three Letters of Recommendation

These letters are required from people who can accurately judge the applicant's academic and/or research performance. It is highly recommended these letters be from faculty familiar with the applicant. Letters of recommendation are submitted electronically to graduate programs through the online application. See the Graduate School for FAQs (https://grad.wisc.edu/apply/) regarding letters of recommendation. Letters of recommendation are due by the deadline listed above.

GRE Scores

GRE scores are optional. Applicants may submit GRE scores, but are not required to do so. Applications without scores are not placed at a disadvantage. However, received scores will be considered as part of our holistic evaluation of applications.

English Proficiency Score

Every applicant whose native language is not English, or whose undergraduate instruction was not in English, must provide an English proficiency test score. The UW-Madison Graduate School accepts TOEFL, IETLS, and Duolingo scores. Your score will not be accepted if it is more than two years old from the start of your admission term. Country of citizenship does not exempt applicants from this requirement. Language of instruction at the college or university level and how recent the language instruction was taken are the determining factors in meeting this requirement.

For more information regarding minimum score requirements and exemption policy, please see the Graduate School Requirements for Admission (https://grad.wisc.edu/apply/requirements/).

Application Fee

Application submission must be accompanied by the one-time application fee. It is non-refundable and can be paid by credit card (MasterCard or Visa). Additional information about the application fee may be found here (https://grad.wisc.edu/apply/) (scroll to the 'Frequently asked questions).

Fee grants are available through the conditions outlined here by the Graduate School (https://grad.wisc.edu/apply/fee-grant/).

REENTRY ADMISSIONS

If you were previously enrolled as a graduate student in the Nuclear Engineering and Engineering Physics program, have not earned your degree, but have had a break in enrollment for a minimum of a fall or spring term, you will need to re-apply to resume your studies. Please review the Graduate School requirements for previously enrolled students (https://policy.wisc.edu/library/UW-1230/). Your previous faculty advisor (or another Nuclear Engineering and Engineering Physics faculty advisor) must be willing to supply advising support and should e-mail the Nuclear Engineering and Engineering Physics Graduate Student Services Coordinator regarding next steps in the process.

If you were previously enrolled in a UW-Madison graduate degree, completed that degree, have had a break in enrollment since earning the degree and would now like to apply for another UW-Madison program; you are required to submit a new student application through the UW-Madison Graduate School online application. For Nuclear Engineering and Engineering Physics graduate programs, you must follow the entire application process as described above.

CURRENTLY ENROLLED GRADUATE STUDENT ADMISSIONS

Students currently enrolled as a graduate student at UW-Madison, whether in Nuclear Engineering and Engineering Physics or a non-Nuclear Engineering and Engineering Physics graduate program, wishing to apply to this degree program should contact the Graduate Admissions Team to inquire about the process and deadlines several months in advance of the anticipated enrollment term. Current students may apply to change or add programs for any term (fall, spring, or summer).

QUESTIONS

If you have questions, contact neepgradadmission@engr.wisc.edu.

FUNDING

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 restrictions 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. The funding for research assistantships comes from faculty research grants. Each professor decides on his or her own research assistantship offers. Funded students are expected to maintain full-time enrollment. See the program website (https://engineering.wisc.edu/blog/explore-nuclear-engineering-and-engineering-physics-faculty-advisors-and-research/) for additional information on current research activities.

ADDITIONAL RESOURCES

International Student Services Funding and Scholarships

For information on International Student Funding and Scholarships, visit the International Student Services website (https://iss.wisc.edu/students/new-students/funding-scholarships/).

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

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework from nuclear engineering, math, physics, chemistry, computer science, or any other engineering department except E P D. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	Courses in which grades of BC, C, or below are received cannot be counted toward the degree except as follows: • 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, • 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 complete the thesis pathway must write a thesis and defend it orally in front of a three-member committee (at least two must be members of the UW-Madison Graduate Faculty).
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.

Only one course (maximum of 3 credits) of independent study (N E 699 Advanced Independent Study, N E 999 Advanced Independent Study) is allowed (regardless of pathway selected).

Thesis Pathway [1]

Maximum of 12 credits for thesis; at least 8 additional credits of N E (http://guide.wisc.edu/courses/n_e/) courses numbered 400 or above; remaining credits (also numbered 400 or above) must be in appropriate technical areas[2]; at least 9 credits must be numbered 500 and above; and up to 3 credits can be seminar credits.

Non-Thesis Pathway [1]

At least 15 credits of N E (http://guide.wisc.edu/courses/n_e/) courses numbered 400 or above; remaining 15 credits (also numbered 400 or above) must be in appropriate technical areas[2]; at least 12 credits must be numbered 500 or above; and up to 3 credits can be seminar credits.

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

[2] Appropriate technical areas are: Engineering departments (except Engineering and Professional Development), Physics, Math, Statistics, Computer Science, Medical Physics, and Chemistry. Other courses may be deemed appropriate by a student's faculty advisor.

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

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

With advisor and Nuclear Engineering and Engineering Physics Graduate Studies Committee Chair approval, students may transfer up to 6 credits of relevant coursework from a prior graduate program. Review the Graduate Program Handbook (see contact box) for information about use and restrictions to this policy. Coursework earned ten or more years prior to admission is not allowed to satisfy requirements.

Undergraduate Credits Earned at Other Institutions or UW-Madison

- **Undergraduate credits from UW-Madison:** With faculty approval, students who have received their undergraduate degree from UW–Madison may apply up to 7 credits of coursework numbered 400 or above toward the minimum graduate degree credit requirement. This work will not be allowed to count toward the 50% graduate coursework minimum unless taken in courses numbered 700 or above. No credits can be counted toward the minimum graduate residence credit requirement. Coursework earned ten or more years prior to admission is not allowed to satisfy requirements.
- **Undergraduate credits from other institutions:** With faculty advisor and Graduate Studies Committee Chair 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 ten or more years prior to admission is not allowed to satisfy requirements.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

The Nuclear Engineering and Engineering Physics MS program does not accept prior credits from UW-Madison Professional programs.

Credits Earned as a University Special student at UW–Madison

With program approval, students are allowed to transfer up to 15 credits of coursework numbered 400 or above taken as a UW–Madison University Special student toward 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 in courses numbered 700 or above or are taken to meet the requirements of a capstone certificate and has the "Grad 50%" attribute. Coursework earned ten or more years prior to admission to a master's is not allowed to satisfy requirements.

PROBATION

Refer to the Graduate School: Probation (https://policy.wisc.edu/library/UW-1217/) policy.

ADVISOR / COMMITTEE

Each student is required to meet with his or her advisor prior to registration every semester. Refer to the Graduate School: Advisor (https://policy.wisc.edu/library/UW-1232/) policy.

CREDITS PER TERM ALLOWED

15 credits

TIME LIMITS

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.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (https://osas.wisc.edu/) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

Nuclear Engineering & Engineering Physics Grievance Procedures

Students who feel that they have been treated unfairly have the right to a prompt hearing of their grievance. Such complaints may involve course grades, classroom treatment, advising, various forms of harassment, or other issues. Any student or potential student may use these procedures.

- The student should speak first with the person toward whom the grievance is directed. In most cases, grievances can be resolved at this level.
- Should a satisfactory resolution not be achieved, the student should contact the program's Grievance Advisor to discuss the grievance. The Graduate Student Coordinator can provide students with the name of this faculty member, who facilitates problem resolution through informal channels. The Grievance Advisor is responsible for facilitating any complaints or issues of students. The Grievance Advisor first attempts to help students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties if necessary. University resources for sexual harassment concerns can be found on the UW Office of Compliance website (https://compliance.wisc.edu/).
- If the issue is not resolved to the student's satisfaction, the student can submit the grievance to the Grievance Advisor in writing, within 60 calendar days of the alleged unfair treatment.
- On receipt of a written complaint, a faculty committee will be convened by the Grievance Advisor to manage the grievance. The program faculty committee will obtain a written response from the person toward whom the complaint is directed. The response will be shared with the person filing the grievance.
- The faculty committee will determine a decision regarding the grievance. The Grievance Advisor will report on the action taken by the committee in writing to both the student and the party toward whom the complaint was directed within 15 working days from the date the complaint was received.
- At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has 10 working days to file a written appeal to the College of Engineering.

The Assistant Dean for Graduate Affairs (engr-dean-graduateaffairs@engr.wisc.edu) provides overall leadership for graduate education in the College of Engineering (CoE) and is a point of contact for graduate students who have concerns about education, mentoring, research, or other difficulties.

The Graduate School has procedures for students wishing to appeal a grievance decision made at the college level. These policies are described

in the Academic Policies and Procedures at https://grad.wisc.edu/academic-policies/.

OTHER

n/a

PROFESSIONAL DEVELOPMENT

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

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

PEOPLE

PROFESSORS

Paul Wilson (Chair)
Wendy Crone
Chris Hegna
Oliver Schmitz
Carl Sovinec
Kumar Sridharan

ASSOCIATE PROFESSORS

Adrien Couet

ASSISTANT PROFESSORS

Stephanie Diem
Benedikt Geiger
Benjamin Lindley
Juliana Pacheco-Duarte
Adelle Wright
Yongfeng Zhang

See also Nuclear Engineering & Engineering Physics Faculty Directory (https://directory.engr.wisc.edu/neep/faculty/).