NUCLEAR
ENGINEERING
AND ENGINEERING
PHYSICS, PH.D.

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

<table>
<thead>
<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

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

- 51 credits approved by the student’s faculty advisor
- 32 credits

Minimum Residence Credit Requirement

Overall GPA Requirement

- 3.00 GPA required.

Graduate GPA Requirement

- This program follows the Graduate School’s policy: 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: 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

- Ph.D. qualifying examination is required of all students.
- After acceptance of the student’s doctoral plan of study,
the student must take an oral preliminary examination.
- Final oral examination is required at the end of the thesis
work.

Language Requirements

- No language requirements.

Graduate School Breadth Requirements

1. All doctoral students are required to complete a doctoral
minor or graduate/professional certificate. In consultation
with, and approval by, the graduate faculty advisor/
department, students should select one of the following
options if they choose the minor:

   - Option A (External Minor): Fulfillment of this minor
     requires approval of the doctoral minor program. This
     minor must be outside of the student’s doctoral major
     program.

   - Option B (Distributed Minor): Fulfillment of this minor
     requires a minimum of 9 credits, total, from two or more
     departments outside the major in courses selected for
     their relevance to a particular area of concentration. No
     course below the 400 level may be used to satisfy this
     requirement.

2. All doctoral students are also required to complete
a graduate faculty advisor/department approved non-
technical minor. Please see the NEEP Graduate Handbook
for information regarding the four options to complete the
non-technical minor.

REQUIRED COURSES

Students must fulfill the coursework requirements for the nuclear
engineering and engineering physics M.S. (http://guide.wisc.edu/
graduate/engineering-physics/nuclear-engineering-engineering-physics-
ms/) degree whether receiving the M.S. degree or going directly to the
PhD. They must complete an additional 9 credits of technical coursework
at the graduate level, beyond the coursework requirement for the MS.
Candidates must take three courses numbered 700 or above; must satisfy
the Ph.D. technical minor requirement; and must satisfy the Ph.D non-
technical minor requirement.
The candidate is also required to complete, as a graduate student, one course numbered 400 or above in each of the following Areas: fission reactors; plasma physics and fusion; materials; engineering mathematics and computation (see Area Coursework Examples below).

**M.S. Coursework Requirements**

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.

These courses are examples that would meet the requirement and are not deemed appropriate by a student's faculty advisor. Other courses may be taken prior to or during the course of study:

- Introduction to Plasmas
- Nuclear Reactor Theory
- Ionizing Radiation
- Nuclear Reactor Engineering
- Monte Carlo Radiation Transport
- Two-Phase Flow and Heat Transfer
- Advanced Nuclear Power Engineering
- Nuclear Reactor Dynamics
- Power Plant Technology
- Methods for Probabilistic Risk Analysis of Nuclear Power Plants
- Plasma Confinement and Heating
- Introduction to Plasmas
- Plasma Processing and Technology

**Materials**

- Nuclear Engineering Materials
- Radiation Damage in Metals
- Solid State Physics

**Engineering Mathematics & Computation**

- Engineering Analysis I
- Engineering Analysis II
- Numerical Linear Algebra
- Numerical Analysis
- Methods of Applied Mathematics I

**Non-Technical Minor Requirements**

Ph.D. candidates must complete one of the following four study options prior to receiving dissertation status. As this is a formal Department requirement, the student should select a Non-Technical Minor early in the program, and must complete it to achieve dissertation status (see below). The Non-Technical Minor must be planned with the help of the candidate’s advisor and must be approved by the Department NonTechnical Minor Advisor except for Study Option IV which must be approved by the Department faculty. A Non-Technical Minor Approval Form is available from the Graduate Student Coordinator, and must be filed prior to submission of the doctoral plan form. Courses numbered below 400 may be used as a part of the Non-Technical Minor.

**Study Option I**: Technology-Society Interaction Coursework. This option is intended to increase the student’s awareness of the possible effects of technology on society and of the professional responsibilities of engineers and scientists in understanding such side effects. These effects could, for example, involve the influence of engineering on advancement of human welfare, on the distribution of wealth in society, or on environmental and ecological systems.

Suggested courses for fulfilling Option I include:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIV ENGR 320</td>
<td>Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CIV ENGR 423</td>
<td>Air Pollution Effects, Measurement and Control</td>
<td>3</td>
</tr>
<tr>
<td>ECON/A E 474</td>
<td>Economic Problems of Developing Areas</td>
<td>3</td>
</tr>
<tr>
<td>GEOG/URB R PL 305</td>
<td>Introduction to the City</td>
<td>3-4</td>
</tr>
<tr>
<td>GEOG/URB R PL 505</td>
<td>Urban Spatial Patterns and Theories</td>
<td>3</td>
</tr>
<tr>
<td>HIST SCI/MED HIST/</td>
<td>Science, Medicine and Religion</td>
<td>3</td>
</tr>
<tr>
<td>RELIG ST 331</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Study Option II**: Humanistic Society Studies Coursework. The basic objectives of this option are to help prepare the student to bridge the gap between C.P. Snow’s "Two Cultures." Snow’s 1959 lecture thesis was that the breakdown of communication between the "two cultures" of modern society - the sciences and the humanities - was a major hindrance to solving the world’s problems. Study might be designed to give a greater appreciation of the arts such as the classics, music, or painting, or it...
might be designed, for example, as preparation for translating technical information to the non-technical public.

Suggested areas of study to fulfill Option II include Anthropology, Area Studies, Art, Art History, Classics, Comparative Literature, Contemporary Trends, English (literature), Foreign Languages (literature), Social Work, Sociology, and Speech. Under either Option I or II, the student must take 6 credits of coursework. The courses must be approved by the student’s advisor and the non-technical minor advisor, and the 6 credits should be concentrated in one topical area. Grades in these courses need not meet the Departmental Grade Policy. However, note that all grades in courses numbered 300 or above courses (including grades for Non-Technical Minor courses) are calculated in the Graduate School minimum 3.0 graduation requirement.

**Study Option III:** Foreign Culture Coursework. This option is intended for the student who desires to live and work in a foreign nation or work with people of a foreign culture. Examples include studies of the history of a foreign nation, of the political stability of a region of the world, of the culture of a particular group within a nation, or of the spoken language of a foreign nation. For Option III the student must take six credits of courses under all of the same conditions and requirements as for Option I and II unless choosing language study. For the latter case, the student must attain a grade of C or better in all courses. If the student has previous knowledge of a language, it is required that either courses beyond the introductory level will be elected or that another language will be elected.

**Study Option IV:** Technology-Society Interactions Experience. There are many possible technology-society interactions that might be more educational and meaningful for the student as an actual experience than coursework. For example, the student might run for and be elected to a position of alderperson in the city government. Consequently, this option allows the student to pursue a particular aspect of the interaction using his own time and resources.

Study Option IV activity must be planned with the student’s advisor and be approved by the faculty. The effort required should be equivalent to 6 credits of coursework. Upon completion of this program, the student will prepare a written or oral report.

**Note:** Students from countries in which English is not the native language have inherently fulfilled these non-technical study goals and are exempt from these formal requirements.