NUCLEAR ENGINEERING

Graduate Program Head
Arthur T. Motta

Program Code
NUCE

Campus(es)
University Park (Ph.D., M.S., M.Eng.)
World Campus (M.Eng.)

Degrees Conferred
Doctor of Philosophy (Ph.D.)
Master of Science (M.S.)
Master of Engineering (M.Eng.)

The Graduate Faculty
View (https://secure.gradsch.psu.edu/gpms/index.cfm?searchType=fac&prog=NUCE)

Graduate programs and research facilities are available in:
- thermal-hydraulics,
- neutronics,
- computational methods,
- advanced controls with applications of artificial intelligence,
- materials,
- radiation monitoring and effects,
- fuel management, and
- radioactive waste management.

Application areas include:
- advanced reactor design,
- safety analysis,
- radiation instrumentation development,
- neutron imaging, and
- plant life extension.

Admission Requirements
Applicants apply for admission to the program via the Graduate School application for admission (http://gradschool.psu.edu/prospective-students/how-to-apply). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (http://gradschool.psu.edu/graduate-education-policies).

Scores from the Graduate Record Examinations (GRE), or from a comparable substitute examination accepted by the Nuclear Engineering graduate program, are required for admission. A student may be admitted at the discretion of the program for graduate study without these scores.

Students with a 3.00 junior/senior grade-point average and with appropriate course backgrounds will be considered for admission. A student may be admitted at the discretion of the program for graduate study without these scores. General aptitude GRE test results are required. The best-qualified applicants will be accepted up to the number of spaces that are available for new students. Exceptions to the minimum 3.00 grade-point average may be made for students with special backgrounds, abilities, and interests.

Letters of recommendation and a statement of purpose written by the applicant are also required to complete the application package.

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants.

See GCAC-305 Admission Requirements for International Students (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-305-admission-requirements-international-students) for more information.

Degree Requirements

Master of Engineering (M.Eng.)
Requirements listed here are in addition to Graduate Council policies listed under GCAC-700 Professional Degree Policies (http://gradschool.psu.edu/graduate-education-policies).

The M.Eng. degree is a nonthesis professional master’s degree. In the M.Eng. degree program, a minimum of 30 credits at the 400, 500, or 800 level is required. Twelve of those credits must be in Nuclear Engineering with at least 18 credits at the 500 level. There are 6 credits required in the following core courses: NUCE 403 Advanced Reactor Design (3 cr.) and NUCE 450 Radiation Detection and Measurement (3 cr.). These may be waived as required courses at the discretion of the program if the student has already taken them or equivalent courses. The culminating experience for the M.Eng. degree is a scholarly paper completed while the student is enrolled in NUCE 596. The scholarly paper must be approved by the adviser, a faculty reader, and the program chair.

Nuclear Security Option
An option in Nuclear Security is available for either the M.S. or the M.Eng. degree. To complete the option, students must complete 15 credits:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUCE 441</td>
<td>Nuclear Security Threat Analysis and Assessments</td>
<td>3</td>
</tr>
<tr>
<td>NUCE 442</td>
<td>Nuclear Security System Design</td>
<td>3</td>
</tr>
<tr>
<td>NUCE 542</td>
<td>Source and Detector Technologies for Nuclear Security</td>
<td>3</td>
</tr>
<tr>
<td>NUCE 543</td>
<td>Nuclear Security Education Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>NUCE 544</td>
<td>Global Nuclear Security Policies</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td></td>
<td><strong>15</strong></td>
</tr>
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Master of Science (M.S.)
Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (http://gradschool.psu.edu/graduate-education-policies)

The M.S. degree program is designed for students to gain advanced knowledge for research, analysis, and design in nuclear engineering. Students pursuing an M.S. degree must complete a minimum of 30 credits at the 400, 500, 600, or 800 levels, with at least 18 credits at the 500 and 600 level, combined. The program requires 6 credits in the following core courses: NUCE 403 Advanced Reactor Design (3 cr.) and NUCE 450 Radiation Detection and Measurement (3 cr.). These may be waived as required courses at the discretion of the program if the student has already taken them or equivalent courses. Students are required to write a thesis, and at least 6 credits in thesis research (NUCE 600 or NUCE 610) must be taken in conjunction with completing the thesis. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School.

Nuclear Security Option
An option in Nuclear Security is available for either the M.S. or the M.Eng. degree. To complete the option, students must complete 15 credits:
Nuclear Engineering

Code   | Title                                           | Credits |
-------|-------------------------------------------------|---------|
NUCE 441 | Nuclear Security Threat Analysis and Assessments | 3       |
NUCE 442 | Nuclear Security System Design                  | 3       |
NUCE 542 | Source and Detector Technologies for Nuclear Security | 3       |
NUCE 543 | Nuclear Security Education Laboratory           | 3       |
NUCE 544 | Global Nuclear Security Policies                | 3       |
Total Credits: 15

Doctor of Philosophy (Ph.D.)
Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (http://gradschool.psu.edu/graduate-education-policies)

The Ph.D. program emphasizes scholarly research and helps students prepare for research and related careers in industry, government, and academia. The Ph.D. program is quite flexible, with minimal formal requirements. Doctoral students must pass a qualifying examination, a comprehensive written and oral examination, and a final oral examination (the dissertation defense). Generally, a Ph.D. student must have 30 credits above a master’s degree before taking a comprehensive examination. To earn the Ph.D. degree, doctoral students must also write a dissertation that is accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

Student Aid
Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (http://gradschool.psu.edu/graduate-funding) section of The Graduate School’s website. Students on graduate assistantships must adhere to the course load limits (http://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants) set by The Graduate School.

In addition, the following awards typically have been available to graduate students in this program:

U.S. Nuclear Regulatory Commission Fellowships
Available to graduate students interested in working in nuclear engineering, covering stipend and tuition.

U.S. Department of Energy-Nuclear Science and Engineering Fellowships
Available to graduate students interested in engineering and engineering support related to nuclear technology; stipend plus tuition.

Courses
Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Nuclear Engineering (NUCE) Course List (https://bulletins.psu.edu/university-course-descriptions/graduate/nuce)