NUCLEAR AND RADIOLOGICAL SCIENCES | PRE-MEDICAL PHYSICS

This degree emphasizes the nuclear sciences rather than nuclear engineering. Students pursue a pre-medical specialization or a pre-medical physics specialization. Any student pursuing this degree must have a selected program, including option area electives, approved in advance by an advisor.

About this Program

- **College:** Herbert Wertheim College of Engineering
- **Degree:** Bachelor of Science
- **Specializations:** Pre-Medical | Pre-Medical Physics
- **Credits for Degree:** 125
- **Additional Information**

To graduate with this major, students must complete all university, college, and major requirements.

Diverse opportunities await graduates of the Department of Nuclear and Radiological Engineering (NRE) because nuclear sciences have and will continue to make major contributions to electricity production, medical diagnostic imaging and therapy, non-destructive testing as well as radiation detection and measurement. These opportunities will continue to grow as we face more challenges in energy production and medicine. For the last three decades, the nuclear industry has contributed over 20% of our country's electricity production, and major advances continue to be made in the development of radiation diagnostics and treatment for medical and industrial applications.

Related Nuclear Engineering and Science Programs

- Combined Degree
- Bachelor of Science in Nuclear Engineering
- Nuclear and Radiological Engineering minor
- Nuclear Radiation and Reactor Analysis certificate

Note that critical tracking is the same for both specializations.

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1

- Complete 1 of 8 critical-tracking courses with a minimum grade of C within two attempts: BSC 2010, CHM 2045 or CHM 2095, MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048, PHY 2049
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete 1 additional critical-tracking course with a minimum grade of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete all 8 critical-tracking courses with minimum grades of C in each course within two attempts
- 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student’s academic record and scheduling availability of courses. Prerequisites still apply.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>Semester One</td>
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<tr>
<td>BSC 2010</td>
<td>Integrated Principles of Biology 1 (Critical Tracking; State Core Gen Ed Biological and Physical Sciences)</td>
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<tr>
<td>BSC 2010L</td>
<td>Integrated Principles of Biology Laboratory 1</td>
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<tr>
<td>CHM 2045</td>
<td>General Chemistry 1 (Critical Tracking; Gen Ed Physical Sciences)</td>
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<tr>
<td>CHM 2095</td>
<td>Chemistry for Engineers 1 (Critical Tracking)</td>
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<tr>
<td>CHM 2045L</td>
<td>General Chemistry 1 Laboratory (Gen Ed Physical Sciences)</td>
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<tr>
<td>MAC 2311</td>
<td>Analytic Geometry and Calculus 1 (Critical Tracking; State Core Gen Ed Mathematics)</td>
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<tr>
<td>State Core Gen Ed Composition; Writing Requirement</td>
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<tr>
<td></td>
<td>Credits</td>
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<tr>
<td>Semester Two</td>
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<tr>
<td>Select one:</td>
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<tr>
<td>CHM 2046</td>
<td>General Chemistry 2 (Gen Ed Physical Sciences)</td>
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<tr>
<td>CHM 2096</td>
<td>Chemistry for Engineers 2</td>
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<tr>
<td>CHM 2046L</td>
<td>General Chemistry 2 Laboratory (Gen Ed Physical Sciences)</td>
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<tr>
<td>ENC 3246</td>
<td>Professional Communication for Engineers (Gen Ed Composition; minimum grade of C required)</td>
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</table>
IUF 1000  What is the Good Life (Gen Ed Humanities)  3
MAC 2312  Analytic Geometry and Calculus 2  (Critical Tracking; Gen Ed Mathematics)  4

Semester Three
State Core Gen Ed Humanities  3
State Core Gen Ed Social and Behavioral Sciences  3

Credits  14

Semester Four
MAC 2313  Analytic Geometry and Calculus 3  (Critical Tracking; Gen Ed Mathematics)  4
PHY 2048  Physics with Calculus 1  (Critical Tracking)  3
PHY 2048L  Laboratory for Physics with Calculus 1  (Gen Ed Physical Sciences)  1
State Core Gen Ed Social and Behavioral Sciences  6

Credits  14

Semester Five
COP 2271  Computer Programming for Engineers  2
MAP 2302  Elementary Differential Equations  (Critical Tracking)  3
PHY 2049  Physics with Calculus 2  (Critical Tracking)  3
PHY 2049L  Laboratory for Physics with Calculus 2  1
STA 3032  Engineering Statistics  3

Credits  12

Semester Six
ENU 4001  Nuclear Engineering Analysis 1  4
ENU 4605  Radiation Interactions and Sources 1  4
ENU 4934  Fundamentals of Nuclear and Radiological Engineering (seminar)  1
PHY 3101  or PHY 3063  Introduction to Modern Physics  or Enriched Modern Physics  3
PHY 3323  Electromagnetism 1  3

Credits  14

Semester Seven
APK 2100C  Applied Human Anatomy with Laboratory  4
EEL 3003  Elements of Electrical Engineering  3
EGS 4034  Engineering Ethics and Professionalism  1
PHY 4424  Optics 1  3
Physics elective  3

Credits  14

Semester Eight
Engineering electives  6

Credits  6

Semester Nine
APK 2105C  Applied Human Physiology with Laboratory  4
ENU 4612  Nuclear Radiation Detection and Instrumentation  3
ENU 4612L  Nuclear Radiation Detection and Instrumentation Laboratory  1
ENU 4630  Fundamental Aspects of Radiation Shielding  3
ENU 4650  Special Problems in Nuclear and Radiological Engineering (individual work)  1
PHY 4604  Introductory Quantum Mechanics  1

Credits  15

Semester Ten
ENU 4145  Risk Assessment for Radiation Systems  3
ENU 4641C  Applied Radiation Protection  2
Engineering electives  6

Physics elective  3

Credits  14

Total Credits  125

1 All nuclear engineering and nuclear engineering sciences majors must pass all required undergraduate department courses with an overall C average.

Engineering Electives
All technical engineering electives must be approved by a department advisor. At least five credits of the technical engineering electives must be ENU courses. Examples include courses in nuclear engineering, engineering materials, thermodynamics, statics, dynamics, and advanced programming.

Examples of Pre-Medical Physics Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>ENU 5626</td>
<td>Radiation Biology</td>
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<tr>
<td>ENU 5658</td>
<td>Imag Sys Med Phys</td>
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The major in nuclear and radiological sciences educates students to work professionally in areas related to the control and safe utilization of nuclear energy, radiation and radioactivity.

Before Graduating Students Must
- Pass an assessment by two or more faculty and/or industry practitioners of performance on a major design experience.
- Pass assessment in two or more courses of individual assignments targeted to each learning outcome. Assessment will be provided by the instructor of the course according to department standards.
- Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major Will Learn to
Student Learning Outcomes (SLOs)

Content
1. Apply knowledge of mathematics, science and engineering for problem solving in engineering.
2. Analyze and interpret experimental data.

Critical Thinking
3. Develop an engineering design to meet specific technical requirements within realistic constraints such as economic, environmental, health and safety and reliability.
4. Foster the need for lifelong learning and the ability to adapt this to engineering practice.

Communication
5. Function effectively on multidisciplinary skills teams.
6. Communicate effectively, using both oral and written presentations, in engineering practice.

Curriculum Map
I = Introduced; R = Reinforced; A = Assessed

<table>
<thead>
<tr>
<th>Courses</th>
<th>SLO 1</th>
<th>SLO 2</th>
<th>SLO 3</th>
<th>SLO 4</th>
<th>SLO 5</th>
<th>SLO 6</th>
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<tbody>
<tr>
<td>ENU 4001</td>
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Assessment Types

- Assignments
- Exams
- Projects
- Presentations
- Additional assessment includes the senior exit survey