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

Critical Tracking

*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

Model Semester Plan

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>
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<th>Course</th>
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<th>Credits</th>
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<tr>
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<td>General Chemistry 1 Laboratory (Gen Ed Physical Sciences)</td>
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<td>MAC 2311</td>
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Semester Two

Select one:

- CHM 2046 | General Chemistry 2 (Gen Ed Physical Sciences) | 3 |
- CHM 2096 | Chemistry for Engineers 2 | 1 |
- CHM 2046L | General Chemistry 2 Laboratory (Gen Ed Physical Sciences) | 1 |
### Curriculum Map

<table>
<thead>
<tr>
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<tr>
<td>ENU 4001</td>
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<td>Radiation Interactions and Sources ¹</td>
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<td>ENU 4934</td>
<td>Fundamentals of Nuclear and Radiological Engineering (seminar)</td>
<td>1</td>
</tr>
<tr>
<td>PHY 3101</td>
<td>Introduction to Modern Physics</td>
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<td>or PHY 3063</td>
<td>or Enriched Modern Physics</td>
<td>3</td>
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<tr>
<td>PHY 3323</td>
<td>Electromagnetism ¹</td>
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### Semester Seven

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<td>EEL 3003</td>
<td>Elements of Electrical Engineering</td>
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<td>EGS 4034</td>
<td>Engineering Ethics and Professionalism</td>
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<td>Optics ¹</td>
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### Semester Nine

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<td>ENU 4612</td>
<td>Nuclear Radiation Detection and Instrumentation</td>
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<tr>
<td>ENU 4612L</td>
<td>Nuclear Radiation Detection and Instrumentation Laboratory ¹</td>
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<tr>
<td>ENU 4630</td>
<td>Fundamental Aspects of Radiation Shielding</td>
<td>3</td>
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<tr>
<td>ENU 4905</td>
<td>Special Problems in Nuclear and Radiological Engineering (individual work)</td>
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<tr>
<td>PHY 4604</td>
<td>Introductory Quantum Mechanics ¹</td>
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### Semester Ten

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<td>ENU 4145</td>
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<tr>
<td>ENU 4641C</td>
<td>Applied Radiation Protection ¹</td>
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</table>

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

### Approved Electives

#### 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>
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<tr>
<td>ENU 5626</td>
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<td>ENU 5658</td>
<td>Imag Sys Med Phys</td>
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### Academic Learning Compact

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

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ENC 3246 Professional Communication for Engineers (Gen Ed Composition; minimum grade of C required) 3

IUF 1000 What is the Good Life (Gen Ed Humanities) 3

MAC 2312 Analytic Geometry and Calculus 2 (Critical Tracking: Gen Ed Mathematics) 4

Credits 14

### Semester Three

State Core Gen Ed Humanities 3

State Core Gen Ed Social and Behavioral Sciences 3

Credits 6

### 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 3

PHY 3323 Electromagnetism ¹ 3

Credits 15

### 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 1

ENU 4630 Fundamental Aspects of Radiation Shielding ¹ 3

ENU 4905 Special Problems in Nuclear and Radiological Engineering (individual work) 1

PHY 4604 Introductory Quantum Mechanics ¹ 3

Credits 15

### Semester Ten

ENU 4145 Risk Assessment for Radiation Systems ¹ 3

ENU 4641C Applied Radiation Protection ¹ 2

Engineering electives 6

Physics elective 3

Credits 14

Total Credits 125
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**Assessment Types**

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