BACHELOR OF SCIENCE IN NUCLEAR AND RADIOLOGICAL ENGINEERING

The undergraduate curriculum in nuclear and radiological engineering is structured to meet the needs of both the student who contemplates employment immediately after graduation and the student planning to pursue graduate study. It provides maximum flexibility in the form of options for each student to develop his or her unique interests and capabilities. The core curriculum covers the basic principles of nuclear engineering, nuclear reactor core design, reactor systems engineering, nuclear power economics, reactor operations, radiation sources and detection instruments, radiation transport, radiation protection, criticality safety, regulatory requirements, and radioactive materials management. In addition to the Institute’s academic requirements for graduation with a bachelor's degree, the following are required for a BS NRE degree.

- A C or better must be earned in
  - MATH 1551: Differential Calculus
  - MATH 1553: Introduction to Linear Algebra
  - MATH 1552: Integral Calculus
  - MATH 2551: Multivariable Calculus
  - MATH 2552: Differential Equations
  - MATH 3670: Probability and Statistics with Applications

- The aggregate GPA of all NRE classes must be a 2.0 or higher.

Program Objectives

The program educational objectives of the Nuclear and Radiological Engineering (NRE) undergraduate program are:

NRE graduates will:

- have a successful career in nuclear and radiological engineering or other fields
- conduct themselves with the highest professional and ethical principles; and
- engage in life-long learning through continuing education, professional development activities, and other career appropriate options.

Wellness

- APHP 1040: Scientific Foundations of Health
- APHP 10: The Science of Physical Activity and Health

Core A - Essential Skills

- ENGL 1101: English Composition I
- ENGL 1102: English Composition II
- MATH 1501: Calculus I ³

Core B - Institutional Options

- CS 1371: Computing for Engineers

Core C - Humanities

- Any HUM (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-c) ¹

Core D - Science, Math, & Technology

- PHYS 2211: Introductory Physics I

Core E - Social Sciences

- Select one of the following:
  - HIST 2111: The United States to 1877
  - HIST 2112: The United States since 1877
  - INTA 1200: American Government in Comparative Perspective
  - POL 1101: Government of the United States
  - PUBP 3000: American Constitutional Issues

- Select one of the following:
  - ECON 2100: Economic Analysis and Policy Problems
  - ECON 2101: The Global Economy
  - ECON 2105: Principles of Macroeconomics
  - ECON 2106: Principles of Microeconomics

- Any SS (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/core-area-e) ¹

Core F - Courses Related to Major

- CHEM 1310: General Chemistry
- PHYS 2213: Introduction to Modern Physics
- MATH 2401: Calculus III
- MATH 2403: Differential Equations
- MATH 3670: Probability and Statistics with Applications

Ethics Requirement (http://www.catalog.gatech.edu/academics/undergraduate/core-curriculum/ethics) ²

Major Requirements

- NRE 2110: Introduction to Nuclear and Radiological Engineering
- NRE 3112: Nuclear Radiation Detection
- NRE 3208: Nuclear Reactor Phys I
- NRE 3301: Radiation Physics
- NRE 3316: Radiation Protection Engineering
- NRE 4206: Radiation Physics Laboratory
- NRE 4208: Nuclear Reactor Physics II
- NRE 4214: Reactor Engineering
- NRE 4232: Nuclear and Radiological Engineering Design
- NRE 4328: Radiation Sources and Applications

Non-NRE Requirements

- COE 2001: Statics
- ECE 3001: Mechanics of Deformable Bodies
- ECE 3025: Electromagnetics
- ECE 3710: Circuits and Electronics
- ECE 3741: Instrumentation and Electronics Lab
- ISYE 3025: Essentials of Engineering Economy
- ME 3322: Thermodynamics, Thermodynamics I
- ME 3340: Fluid Mechanics, Fluid Mechanics I
- ME 3345: Conduction and Radiation Heat Transfer

Technical Electives

- Technical Electives ⁴

Total Credit Hours

126

Bachelor of Science in Nuclear and Radiological Engineering
No pass-fail courses allowed.

Student must earn a 2.0 GPA within NRE courses.

If a course is repeated, only the last grade is included in the calculation.

1 Students must complete an Ethics requirement. See below for allowable Ethics courses.
2 Students must complete one Ethics course during their program.
3 Minimum grade of C required.
4 Any 3000-level or higher course from the College of Computing, Engineering, or Sciences. APPH and PSYC courses not allowed.

Cooperative Plan

Since 1912, Georgia Tech has offered a five-year Undergraduate Cooperative Program to those students who wish to combine career-related experience with classroom studies. The program is the fourth oldest of its kind in the world and the largest optional co-op program in the country.

Students alternate between industrial assignments and classroom studies until they complete four or five semesters of work. Co-op students with nuclear and radiological engineering majors complete the same coursework on campus that is completed by regular four-year students. Most co-op students begin the program as freshman or sophomores and are classified as full-time students regardless whether they are attending classes on campus or are full-time at an employer’s location.

Students who participate in the program have the opportunity to develop career interests, become more confident in their career choices, and develop human relation skills through their work experience. Graduates of the program receive a bachelor’s degree with a Cooperative Plan designation. Woodruff School students have traditionally been the largest group participating in the program.

Students can also complete work assignments in a foreign country as part of the International Cooperative Program. This program is a great opportunity to utilize foreign language skills, gain a global perspective, and experience a diverse culture. Proficiency in a foreign language is necessary to earn the International Cooperative Plan degree designation. For more information on the Cooperative Program, go to www.coop.gatech.edu.

The Undergraduate Professional Internship Program is for nuclear and radiological engineering students who do not participate in the Cooperative Program, but want some career-related experience before graduation. Students generally work for one semester, usually in the summer, with an option for more work. Students must have completed at least thirty hours of coursework at Georgia Tech before they can participate in the program. For more details, see: www.upi.gatech.edu (http://www.upi.gatech.edu).

In addition, there is a Work Abroad Program (www.workabroad.gatech.edu (http://www.workabroad.gatech.edu)), which complements a student’s formal education with paid international work experience directly related to nuclear and radiological engineering. Participating students typically include juniors and seniors. The international work assignments are designed to include practical training, cross-cultural exposure and learning, and the acquisition of needed skills.

For more information about all of the programs in the Center for Career Discovery and Development, visit www.careerdiscovery.gatech.edu (http://careerdiscovery.gatech.edu).

The BS/MS Program

The Woodruff School offers a BS/MS program for those students who demonstrate an interest in and ability for additional education beyond the BS degree. Woodruff School students with a GPA of 3.5 or higher are eligible to apply for the program after completion of 30 credit hours at Georgia Tech, but before the completion of seventy-five credit hours, including transfer and advanced placement credits. Students who have more than 75 credit hours will be considered for the program on a case-by-case basis.

Participants in the BS/MS Program in the Woodruff School can obtain a master’s degree in mechanical engineering, nuclear engineering, medical physics, or in Georgia Tech’s interdisciplinary bioengineering graduate program. There are two options to consider:

Non-Thesis Option

The Non-Thesis Option is completed by taking 10 classes according to the MS degree requirements. In many cases, two courses can be counted towards both a student’s BS and MS degrees, thereby streamlining the process. With proper planning, most MS non-thesis degrees could be completed in one year.

Thesis Option

The Thesis Option involves working with a faculty member on a project in a wide range of research topics being investigated by Woodruff School faculty members. This will give you hands-on experience in working with a faculty mentor; the opportunity to work in a laboratory or a research environment; and the chance to perform theoretical and experimental work. These events will foster your career interests and expand your selection of possible employers. In some cases, a student will receive a graduate research assistantship, which includes a stipend and a tuition waiver. The time to graduation depends on your thesis project, your advisor, and your work ethic.

During the first year of your graduate studies, you will be encouraged to continue for the PhD. In many cases, you might be working on an interesting topic of study as part of your master’s degree research that could provide the basis for doctoral research.

BS/MS Information (https://www.me.gatech.edu/undergraduate/bsms)