NUCLEAR ENGINEERING, B.S.

Nuclear engineers harness the strongest forces of nature to tackle some of society's biggest challenges. Our curriculum gives students depth and breadth to keep up with rapidly changing technology, and our close-knit learning community supports our students' success during their degree and as they launch their careers. The radiation sciences option (http://guide.wisc.edu/undergraduate/engineering/nuclear-engineering-engineering-physics/nuclear-engineering-bs/nuclear-engineering-radiation-sciences-bs/) provides a pathway for careers in medical applications of radiation.

Nuclear energy is the largest source of clean electricity in the United States and new technologies will allow its impact to grow as we decarbonize our economy. Most nuclear engineers design, build and operate nuclear power plants—today based on fission of uranium, but in the future, based on fusion of hydrogen. With no greenhouse gas emissions, nuclear energy is a reliable and predictable partner to other clean electricity, like wind, solar and hydro. Nuclear power sources have even more potential as new technologies and are deployed to remove carbon emissions from industrial processes like hydrogen production, water desalination, and steel manufacturing.

With radiation from man-made radioisotopes and particle accelerators, we can diagnose and treat cancer and other diseases. Nuclear engineers in the radiation sciences option (http://guide.wisc.edu/undergraduate/engineering/nuclear-engineering-engineering-physics/nuclear-engineering-bs/nuclear-engineering-radiation-sciences-bs/) design systems to generate radioactive tracers that can be injected into patients to pinpoint tumors, stress fractures, and cardiac diseases, while others build accelerators that deliver radiation precisely to diseased tissue while avoiding sensitive organs. Talk to your academic advisor about declaring the Radiation Sciences option. Students must have, and are expected to maintain, a 3.0 cumulative GPA.

Today's rovers on Mars are powered by nuclear power sources and tomorrow's spacecrafts will need nuclear power to transport humans far into space. Nuclear engineers build radioisotope thermal generators that provide nonstop power with no moving parts to deep-space probes and planetary vehicles, allowing missions that last for many years. Nuclear space propulsion cuts the travel time to other planets by months and surface power ensures reliable energy once the spacecraft lands.

Using advanced radiation detection systems, we can seek out explosives and nuclear weapons being smuggled in shipping containers. Nuclear engineers combine sources and detectors that use penetrating radiation that not only can see objects through thick shields, but can also determine the composition of the items inside. Additionally, they use machine learning and artificial intelligence to combine the signals from these systems for even more insight.

Our curriculum starts with an Introduction to Nuclear Engineering designed for first year students to learn about a variety of technical nuclear topics and also to engage with some societal challenges. Later on, the curriculum focuses on the deepest physics and math base in the College of Engineering to prepare our graduates for careers with constantly evolving technologies based on the newest scientific discoveries. We transition from these fundamentals to more applied topics in radiation transport, thermal systems, materials science, imaging and detectors, while students build skills in computational modeling and simulation. All of our students also take at least one course that offers an experience with the UW Nuclear Reactor. Students in the radiation sciences option will complete their degree with graduate courses from the internationally recognized Medical Physics program. This interdisciplinary degree program overlaps with other engineering disciplines, allowing our graduates to transition into a variety of industries and careers.

Small class sizes allow students and professors to get to know each other in a supportive learning community starting in their first year. Many students participate in undergraduate research across one of the biggest research portfolios in the College of Engineering. Faculty collaborations with companies in nuclear science and technology—both established and newcomers, as well as the country's national laboratories—provide a professional network that helps students find internships and launch their careers.

NUCLEAR ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES

The faculty recognize that our graduates will choose to use the knowledge and skills they have acquired during their undergraduate years to pursue a wide variety of career and life goals and we encourage this diversity of paths. Regarding the Nuclear Engineering program, we initially expect graduates will begin their careers in fields that utilize their knowledge, education and training in the interaction of radiation with matter as it applies to power generation, health and medical physics, security and safeguards and other engineering fields.

Whatever path our graduates choose to pursue, our educational objectives for the nuclear engineering program are to allow them to:

1. Exhibit strong performance and continuous development in problem-solving, leadership, teamwork, and communication, initially applied to nuclear engineering, and demonstrating an unwavering commitment to excellence.
2. Demonstrate continuing commitment to, and interest in, his or her training and education, as well as those of others.
3. Transition seamlessly into a professional environment and make continuing, well-informed career choices.
4. Contribute to their communities.