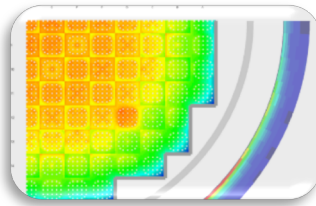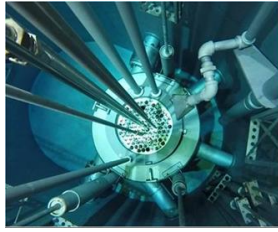# Nuclear and Radiation Engineering
Career Gateway Elective

Track Description

The demand for nuclear and radiation engineers will continue to encompass many new areas and technologies which can expect students to enter a wide choice of challenging and rewarding career opportunities and prepare them to work on a variety of diverse problems in industry, national laboratories, graduate school and medical physics.

Faculty Mentors

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Kevin Clarno   clarno@utexas.edu

Industry Applicability

This certificate program area is appropriate to prepare mechanical engineers for jobs in industry that deal with one or more of the following:

- Mechanical Engineer or Reactor Operator at nuclear power plants (e.g. South Texas Project and Comanche Peak in Texas) or design future nuclear submarines and carriers at Knolls or Bettis Atomic Power Laboratories

- Researcher at a National Lab (Los Alamos, Sandia, Oak Ridge, etc)

- Basics to enter Medical Physics or Aerospace

- Potential to enter nuclear engineering graduate schools involved with a wide range of research projects

Approved Course Work (choose any four)

M E 336P Concepts in Nuclear/Radiation Engineering

M E 337C Introduction to Nuclear Power Systems

M E 337F Radiation and Radiation Protection

M E 337G Nuclear Safety and Security

M E 361E Nuclear Reactor Engineering

M E 361F Radiation and Radiation Protection Laboratory

M E 377K Projects in Mechanical Engineering (with approval of professor)

Selected Examples

Radiation Effects on Materials: Electronic devices are susceptible to damage from ionizing radiation (neutrons, gamma-rays, x-rays, electrons, and heavy ions). This damage can render critical systems inoperable when subjected to a flux of radiation including that radiation produced from a nuclear weapon. We study (via both simulation and measurement) the effects of ionizing radiation on electronic devices as well as other materials and utilize this information to help design and produce systems that are less susceptible to failure.

Computational Nuclear Energy: To transform the world to carbon-free energy, a new generation of advanced nuclear reactors must be designed, licensed, and built that are economical, inherently safe, and sustainable. The Computational Nuclear Energy group develops and applies advanced modeling and simulation tools that leverage high-performance computing to integrate all of the physics (radiation transport, heat transfer, fluid dynamics, thermochemistry) and efficiently predict the performance and demonstrate the safety of novel nuclear systems.

Robotics: The Nuclear and Applied Robotics Group is an interdisciplinary research group whose mission is to develop and deploy advanced robotics in hazardous environments including radiation in order to minimize risk for the human operator.

Nuclear Security and Nonproliferation: The greatest threat to the security of nations and world peace is the spread of weapons of mass destruction and specifically nuclear weapons. It is of prime importance to deter, prevent, and detect the spread of nuclear materials and to respond and recover from a nuclear event to mitigate the risks of nuclear proliferation. Our research is focused on the safe handling of special nuclear materials, the identification of potential threats, the analysis of any nuclear detonation and the deterrence of the proliferation of nuclear materials through advanced detection technologies.

Environmental Pathways: The study of the effect of naturally occurring and technologically produced radioactivity in the environment is of prime importance for human health and ecological impact. Studies include radioactive waste management from nuclear power plants and industrial production of phosphates and oil exploration.

Organizations

American Nuclear Society UT Student Chapter   ans.utexas@gmail.com