NUCLEAR & RADIOLOGICAL ENGR (NRE)

NRE 6101. Transport Fundamentals. 3 Credit Hours.
Neutral and charged particle transport. Fluid mass, energy, and momentum transport. Models used in nuclear radiation transport; fluid hydrodynamics, radiative and plasma transport.

NRE 6102. Plasma Physics. 3 Credit Hours.
Physics of ionized plasmas. Magnetic confinement, kinetic and fluid theories, equilibrium, waves and stability, plasma-material interactions, atomic/molecular-plasma interactions, multispecies transport. Plasma processing applications.

NRE 6103. Computational Methods of Radiation Transport. 3 Credit Hours.
Deterministic and stochastic computational methods for solving transport equations of neutral particles.

NRE 6201. Reactor Physics. 3 Credit Hours.
Fundamentals of reactor physics for nuclear analysis of neutron chain reactors and for developing tools required for design of those reactors.

NRE 6301. Reactor Engineering. 3 Credit Hours.
Two-phase flow, boiling heat transfer, fast reactor thermal-hydraulics, reactor thermal-hydraulics uncertainty analysis, loss-of-coolant accidents. Reactor thermal- hydraulic accident analysis.

NRE 6401. Advanced Nuclear Engineering Design. 3 Credit Hours.
Synthesis of principles of nuclear engineering in the design of nuclear reactors and other facilities.

NRE 6434. Nuclear Criticality Safety Engineering. 3 Credit Hours.
Concepts, computational techniques, and the principal methods of criticality safety such as accident experience, standards, experiments, computer and hand calculations, limits and regulations. Application to overall facility operation.

NRE 6501. Nuclear Fuel Cycle. 3 Credit Hours.
Fission fuel cycle, uranium mining and milling, enrichment. Fuel fabrication. In-core fuel management. Reprocessing and fuel cycle economics. Spent-fuel waste management.

NRE 6502. Nuclear Materials. 3 Credit Hours.
Materials science and engineering of metallic and ceramic fuels; cladding, structural, and control materials including radiation effects.

NRE 6504. Management of the Nuclear Enterprise. 3 Credit Hours.
Identify and understand the unique challenges of and techniques for managing highly technical, potentially hazardous operations, issues within the nuclear industry.

NRE 6505. Fundamentals of Nuclear Nonproliferation. 3 Credit Hours.
This course explores the fundamentals of nuclear energy generation, pathways of materials misuse, the implication of nuclear technology for international security and policy.

NRE 6720. Seminar: Politics Tech & Proliferation. 3 Credit Hours.
This seminar course is designed specifically to encourage new thinking and creative effort on nuclear deterrence and strategic stability for our global future.

NRE 6755. Radiological Assessment and Waste Management. 3 Credit Hours.
Critical analyses of sources and human exposures, mathematical models for movement through the biosphere, environmental transport, and exposure for nuclear facilities and waste disposal processing. Crosslisted with HP 6755.

NRE 6756. Radiation Physics. 3 Credit Hours.
Characteristics of atomic and nuclear radiation, transition probabilities, radioactivity and isotopes, cross sections, electromagnetic radiation, neutrons, and charged particle interaction with matter. Crosslisted with HP 6756.

NRE 6757. Radiation Detection. 3 Credit Hours.
Introduction to the theory and application of radiation detectors, measurement methods, signal processing, and data analysis. Crosslisted with HP 6757.

NRE 6758. Numerical Methods in Mechanical Engineering. 3 Credit Hours.
Numerical methods for solution of engineering problems; initial, eigenvalue, and boundary-value problems; computational stability for ordinary and linear partial differential equations. Crosslisted with ME and HP 6758.

NRE 6759. Radiation Shielding Principles and Analysis. 3 Credit Hours.
Principles of Radiation Shielding; Design of Shields; Computational Methods for Analysis of Shielding; Emphasis on Monte Carlo Simulation as a Shielding Tool.

NRE 6XXX. Nuclear & Radiological Engineering Elective. 1-21 Credit Hours.

NRE 7000. Master's Thesis. 1-21 Credit Hours.

NRE 7103. Advanced Plasma Physics. 3 Credit Hours.
Classical and collective transport phenomena, plasma instabilities, plasma-materials interactions, and plasma edge physics. Emphasis on magnetic fusion, plasma processing, and other plasma applications research.

NRE 7203. Advanced Reactor Physics. 3 Credit Hours.
Advanced topics in reactor physics and transport theory.

NRE 7757. Teaching Practicum. 3 Credit Hours.
Supervised teaching for doctoral students. Teaching techniques, course and curriculum design, student evaluation methods and criteria. Students may, in some instances, prepare and present lectures. Crosslisted with HP, ME, and CHBE 7757.

NRE 8011. Seminars in Nuclear Engineering. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

NRE 8012. Seminars in Nuclear Engineering. 1 Credit Hour.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

NRE 8014. Seminars in Nuclear and Radiological Engineering. 2 Credit Hours.
Seminars involving current research projects presented by graduate students, faculty, and invited speakers.

NRE 8801. Special Topics in Nuclear Engineering. 1 Credit Hour.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8802. Special Topics in Nuclear Engineering. 2 Credit Hours.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8803. Special Topics in Nuclear Engineering. 3 Credit Hours.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8804. Special Topics in Nuclear Engineering. 4 Credit Hours.
Special topic offerings of current interest in nuclear engineering not included in regular courses.

NRE 8805. Special Topics in Nuclear Engineering. 5 Credit Hours.
Special topics offerings of current interest in nuclear engineering not included in regular courses.

NRE 8806. Special Topics in Nuclear Engineering. 6 Credit Hours.
Special topics offerings of current interest in nuclear engineering not included in regular courses.

NRE 8901. Special Problems in Nuclear Engineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8902. Special Problems in Nuclear Engineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8903. Special Problems in Nuclear Engineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8904. Special Problems in Nuclear Engineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8905. Special Problems in Nuclear Engineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8906. Special Problems in Nuclear Engineering. 1-21 Credit Hours.
Individual studies and/or experimental investigations of problems of current interest in nuclear engineering.

NRE 8997. Teaching Assistantship. 1-9 Credit Hours.
For graduate students holding graduate teaching assistantships.

NRE 8998. Research Assistantship. 1-9 Credit Hours.
For graduate students holding graduate research assistantships.

NRE 9000. Doctoral Thesis. 1-21 Credit Hours.