

## NUCLEAR SCIENCE • NS

General education courses are marked with stars (★).

- 3411 Fundamentals of Nuclear Radiation Science (3) F,S** Prereq.: one sem. of MATH 1021 or equivalent and one sem. of chemistry or physics; 2 hrs. lecture; 3 hrs. lab. Nuclear structure, transmutations, decay, interactions of radiation with matter; radiation detection and measurement.
- 4141 Radioecology (3) F** Prereq.: NS 4101 or equivalent. 2 hrs. lecture; 3 hrs. lab. Also offered as ENV5 4141. Radio tracers, stable tracers, and radiation effects in both natural and laboratory-contained communities of organisms.
- 4352 Environmental Radiological Evaluation and Remediation (2) S** Prereq.: NS 3411 or permission of instructor. Methods of surveying and sampling to determine radiological concentrations; federal and state regulations governing remediation criteria; models and computer codes used to estimate dose; remediation planning and implementation.
- 4353 Environmental Radiological Evaluation and Remediation Laboratory (1) S** Prereq.: credit for or concurrent enrollment in NS 4352. Laboratory supplement to NS 4352. Sampling and analytical techniques used to measure radionuclides in the environment.
- 4527 Nuclear Reactor Theory and Design (3) F,S** Prereq.: two semesters of physics and an introductory course in computer programming. Characteristics of radioactive materials, neutron interactions, the fission process; static criticality, time-dependent behavior of cores, and design of nuclear power reactors.
- 4566 Nuclear Reactor Systems (3) F** Prereq.: NS 4527 or equivalent. Engineering aspects of reactor systems; nuclear fuel cycles, isotope separation, mechanical and thermal design, selection of materials, and environmental impact of nuclear facilities.
- 4570 Nuclear Facility Safety (3) S** Prereq.: PHYS 2102 or equivalent. Safety analysis of facilities that utilize radiation sources including hospitals and industrial sites; accident sequences; dispersal of radionuclides; estimation of dose and dose commitments; and engineered safeguards.
- 7115 N-15 Stable Tracer Methodology for Biological Sciences (2) S-E** Prereq.: consent of instructor. 1 hr. lecture; 3 hrs. lab. Quantitative N-15 tracer applications and methodology in biological nitrogen systems, combining N-15 procedures with mass spectrometer techniques.
- 7520 Nuclear Reactor Materials (3) V** Principles governing structure and properties of materials used in nuclear reactors; radiation effects, problems in selection, fabrication, and use of these materials.
- 7525 Nuclear Engineering Laboratory (2) S** Prereq.: credit or registration in NS 7527. 6 hrs. lab. Operation of nuclear counting and spectroscopy systems; measurements of neutron behavior in multiplying and non-multiplying media; development of design parameters from empirical data.
- 7527, 7528 Reactor Engineering (3,3) F,S** Prereq.: consent of department. NS 7527 is prerequisite for 7528. Basic concepts of reactor physics; slowing-down theory, homogeneous and heterogeneous reactors; diffusion and transport theories for neutron flux calculations; criticality calculations: one-group, two-group, and multigroup methods; core burn up analysis.
- 7529 Nuclear Reactor Dynamics (3) S** Prereq.: NS 7527 and credit for or registration in NS 7528. Transient reactor analysis; analytical and numerical point kinetics calculations; perturbation theory expressions for reactivity; feedback effects; reactor transfer functions and stability; coupled neutronics and thermal hydraulic transients; space-time kinetics.
- 7555 Nuclear Reactor Analysis (3) S** Prereq.: MATH 4038 or 4340 and NS 7527; or equivalent. Numerical methods and solutions to multigroup neutron diffusion and transport equations; lattice physics methods; nodal techniques; applications to fuel management and light water reactor core physics analysis; calculation of temperature coefficients; advanced reactor systems.
- 7566, 7567 Advanced Nuclear Reactor Systems (3,3) F,S** Prereq.: NS 4527 or equivalent. Engineering aspects of fission reactor systems, including fuel behavior, energy removal, materials selection, and core interface with the balance of the plant.
- 7575 Two-Phase Flow and Heat Transfer (3) Prereq.: ME 4433 or equivalent.** Modeling and analysis of liquid-vapor flow systems and applications in nuclear reactor design and safety; nucleation phenomena; boiling heat transfer, burnout, condensation; flow instabilities, critical flow, loss of coolant accidents.
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