

Nuclear Engineering

Course Learning Outcomes are measurable statements that are used to identify the specific knowledge and skills that a student should have at the end of a course.

NE 1120

L1- Students will appreciate the difference between nuclear energy and chemical energy .

L2- Students will learn about half lives of radioactive isotopes.

L3- Students will learn about the historical background of the development of nuclear weapons and the subsequent development of the nuclear power industry.

NE 3301

L1- To demonstrate a working knowledge of nuclear reactions, especially radioactive decay and neutron-induced fission.

L2- To describe, both qualitatively and quantitatively, the interaction of radiation with matter.

L3- To demonstrate a basic understanding of nuclear reactor physics.

NE 3302

L1- Understand the basics of neutron multiplication factor calculations and design of the physics of nuclear reactor cores.

L2- To understand the time behavior of nuclear reactors and especially the importance of the delayed neutrons.

L3- To appreciate the differences between nuclear power for electricity production and other forms of generating electricity, focusing on the thermodynamics aspects.

NE 4419

L1- Understand the sources of energy and their contributions to the energy and power needs of the nation and the world.

L2- Understand the special engineering challenges of using each of these sources of energy efficiently and environmentally effectively.

L3- Understand the economics behind the costs of the uses and applications of each of these forms of energy.

L4- Understand the energy conversion systems for nuclear power plants, the advantages/disadvantages (including overall environmental effects) of each type of present plants, and those of the new Generation IV concepts.

NE 4445

L1- To study separately the three independent variables of reactor physics i.e. variations in neutron flux in: space, energy, and time.

L2- Focusing on monoenergetic, steady state diffusion theory; to solve diffusion boundary-value problems in various contexts.

L3- To understand the importance of delayed neutrons in reactor kinetics, and to derive and solve the point-kinetics equations. Also, to extend the theory to include energy-dependence through the group-diffusion method

NE 4446

L1- To gain detailed and quantitative understanding of the individual components of the nuclear fuel cycle: uranium mining and milling, enrichment, LEU fuel fabrication, reactor fuel management, reprocessing, and waste management.

L2- To understand, from a systems analysis perspective, how various fuel cycle alternatives interact, and the range of mass flows and compositions attendant to a given choice of fuel cycle technology.

L3- To understand and demonstrate knowledge of how different reactor technologies interact with the nuclear fuel cycle.

NE 4451

L1 To demonstrate understanding of professional and ethical responsibilities of a practicing nuclear engineer.

L2- To comprehend key contemporary technical and policy issues of nuclear engineering, nuclear power, the nuclear fuel cycle, and nuclear research.

NE 4487

L1- Learn the basics of diagnostic x-ray production (20 to 150 keV) and imaging.

L2- Learn the basics of computerized tomography using x-rays.

L3- Learn the basic of Single Photon Emission Computerized Tomograph (SPECT) and of Photon Emission Tomography (PET).

L4- Learn the basics of Magnetic Resonance Imaging (MRI)

L5- Learn the basics of radiation cancer therapy.

NE 4496A

L1- Understand the design process.

L2- Make a design decision and select a project.

L3- Produce a preliminary design.

L4- Students will select (or obtain) a mentor or sponsor for their selected project.

L5- Students will receive instruction on engineering ethics.

NE 4496B

L1- Students will demonstrate progress throughout the semester on the design (which may be an analysis) of the selected project from the first semester.

L2- Students will complete the design/analysis and construction (if appropriate) of the selected project.