

# Nuclear Sci and Engr (NSEN)

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## Courses

### ***NSEN 5599 Experimental Course: 1-6 semester hours.***

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

### ***NSEN 6601 Nuclear Engineering Experiments: 3 semester hours.***

Experimental verification of theoretical models will be stressed. Kinetic behavior, neutron spatial distribution, perturbation, and other characteristic equations will be investigated. PREREQ: NE 5545, NE 4445, or equivalent.

### ***NSEN 6603 Thermal Hydraulics: 3 semester hours.***

Advanced studies of both fluid flow and heat transfer in nuclear reactor cores. Conservation equations constitutive relations formulation and solution approaches for complete equation set. PREREQ: ME 3341 and ME/NE 5576 or ME 4476.

### ***NSEN 6604 Dynamic Behavior of Nuclear Systems: 3 semester hours.***

Kinetic behavior of nuclear reactors including feedback effects of power transients, fuel burn up, coolant perturbations, etc. Mathematical models developed to predict both short and long term behavior. PREREQ: NE 4445 or NE 5545.

### ***NSEN 6605 Nuclear Reactor Design: 3 semester hours.***

Detailed treatment of current, advanced nuclear power reactor designs. Emphasis on the inherent and engineered safety features and on advantages and disadvantages of each design. PREREQ: NE 5545 or NE 4445.

### ***NSEN 6608 Radiation Transport: 3 semester hours.***

Advanced treatment of radiation transport and shielding concepts; interaction and attenuation of neutral particles, including photons. Use of deterministic and Monte Carlo computer codes. PREREQ: NE 5521 or NE 4421.

### ***NSEN 6609 Radiation Detection Measurement and Applications: 3 semester hours.***

Advanced treatment of radiation detectors, measurement techniques, data acquisition, and signal processing. Emphasis on applications in science, industry, and medicine. PREREQ: NE 5545, NE 4445 or NSEN 6608.

### ***NSEN 6615 Introduction to Practical Nuclear Engineering: 3 semester hours.***

Basic concepts of nuclear reactor physics. Present nuclear plant descriptions. Evaluation of fossil, nuclear plant environmental impacts, cycle and overall efficiencies and economics. PREREQ: Acceptance in Certificate Program in Applied Nuclear Energy.

### ***NSEN 6616 Special Applications of Nuclear Energy: 3 semester hours.***

Isotopic power systems for remote applications, nuclear propulsion for space vehicles, process heat and space heat reactors, maritime nuclear power plants, medical and industrial applications of nuclear radiation. PREREQ: Acceptance in Certificate Program in Applied Nuclear Energy.

### ***NSEN 6617 Applications of Nuclear Energy: 3 semester hours.***

Continued study of nuclear power plant design, operation, and safety analysis of present plants, proposed future concepts. Examination of biological effects of radiation and nuclear medicine, food irradiation and waste heat applications. PREREQ: NSEN 6615 and acceptance in Certificate Program in Applied Nuclear Energy.

### ***NSEN 6618 Radioactive Waste Management: 3 semester hours.***

Overview of historical, legal, political and social aspects of radioactive waste management; radwaste across the nuclear fuel cycle; waste definition and classification, treatment and disposal; design and assessment of repositories and radionuclide migration. PREREQ: NSEN 6684 and NSEN 6685 or equivalent.

### ***NSEN 6619 Materials Science of Radwaste: 3 semester hours.***

Materials chemistry and fabrication of waste glasses, ceramics and cements; waste form development and characterization; waste form degradation; radionuclide release and migration. PREREQ: ENGR 3350 and NE 5546 or equivalent.

### ***NSEN 6631 Computational Transport Theory: 3 semester hours.***

Study of advanced theories used in the calculation of nuclear reactor parameters including such topics as the Boltzman transport equation with energy and space dependence multi-group, multi-region diffusion for reflected systems, perturbation theory, etc. Special emphasis will be given to the application of digital computers in nuclear reactor design problems. PREREQ: NSEN 6608.

### ***NSEN 6651 Nuclear Engineering Seminar: 1 semester hour.***

Current topics in nuclear engineering and health physics. Invited speakers will be used when possible. Student presentations required. May be taken a maximum of four times. Graded S/U. PREREQ: Permission of instructor.

### ***NSEN 6678 Probabilistic Risk Assessment: 3 semester hours.***

Detailed development of fault tree and event tree logic. Calculation of event sequence, cut-set, and top event probabilities. PREREQ: NE 4478 or NE 5578

### ***NSEN 6684 Nuclear Engineering Basics: 3 semester hours.***

For BS physical science graduates with little or no nuclear background. Lecture, laboratory each semester. Nuclear science; reactor physics, kinetics and thermal hydraulics; nuclear fuel cycle. PREREQ: Permission of NE Department Chair.

### ***NSEN 6685 Nuclear Engineering Basics: 3 semester hours.***

For BS physical science graduates with little or no nuclear background. Lecture, laboratory each semester. Nuclear science; reactor physics, kinetics and thermal hydraulics; nuclear fuel cycle. PREREQ: Permission of NE Department Chair.

### ***NSEN 6686 Modeling Experimentation and Validation: 3 semester hours.***

Two-week summer course. Provides early career nuclear engineers with advanced studies in integrated modeling, experimentation, and validation. The course emphasis rotates yearly among thermal-hydraulics, reactor physics, fuels and materials, and simulations. PREREQ: Permission of the NE Department Chair.

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### ***NSEN 8850 Doctoral Dissertation: 1-24 semester hours.***

Research toward completion of the dissertation for the Ph.D. in Engineering and Applied Science. Variable credits. May be repeated. Graded S/U.