

# NUCLEAR ENGINEERING (NUC E)

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**Any experimental courses offered by NUC E can be found at:**

registrar.iastate.edu/faculty-staff/courses/explistsings/ (<http://www.registrar.iastate.edu/faculty-staff/courses/explistsings/>)

**Courses primarily for undergraduates:**

**NUC E 401: Nuclear Radiation Theory and Engineering**

(3-0) Cr. 3. F.

*Prereq: PHYS 222, MATH 266 or MATH 267*

Atomic and nuclear physics. Radioactivity and reaction rates. Cross sections. Introduction to neutron diffusion theory. Engineering applications of radiation theory.

**NUC E 402: Nuclear Reactor Engineering**

(3-0) Cr. 3. S.

*Prereq: NUC E 401, permission of Nuclear Engineering program director*

WWW only. Fission and chain reactions. Neutron diffusion and moderation. Reactor equations. Fermi Age theory. Multigroup and multiregional analysis. Contact Nuclear Engineering program director for enrollment information.

**NUC E 405: Radiation Protection and Shielding**

(3-0) Cr. 3.

*Prereq: NUC E 401, permission of Nuclear Engineering program director*

WWW only. Basic principles and concepts of radiation protection and design: dosimetric units and response functions, hazards of radiation dose, radiation sources, basic methods for dose evaluation, and shielding design techniques for photons and neutrons.

**NUC E 410: Nuclear Reactor Theory**

(3-0) Cr. 3. F.

*Prereq: NUC E 401, permission of Nuclear Engineering program director*

WWW only. An introduction to neutron diffusion theory, neutron moderation, conditions for criticality of nuclear reactors.

**NUC E 421: Nuclear Criticality Safety**

Cr. 3. F.

*Prereq: NUC E 401*

Nomenclature, theory, and practice of nuclear criticality safety. Review of nuclear criticality accidents, analytical methods used in criticality analysis, review of standards and regulations, and developing criticality safety evaluations.

**NUC E 430: Nuclear Energy and Society**

(3-0) Cr. 3. Alt. S., offered even-numbered years.

*Prereq: NUC E 401*

The relationship between nuclear energy and society is examined from the perspective of significant events in the commercial nuclear power industry. Event analysis includes differences and similarities of technologies along with environmental impact. Political, social, media and regulatory responses for each event are discussed along with the impact on future plant design.

**NUC E 441: Probabilistic Risk Assessment**

(3-0) Cr. 3. S.

*Prereq: STAT 305 or equivalent*

Methods for analysis of nuclear power systems. Fault tree and event tree analysis methods. Mathematical basics for dealing with reliability data, theory, and analysis. Case studies of accidents in nuclear power systems.

**NUC E 461: Radiation Detection, Measurement and Simulation**

(3-0) Cr. 3. S.

*Prereq: NUC E 401*

Principles of nuclear radiation safety and detection. Radiation energy spectroscopy. Counting statistics and error analysis. Monte Carlo simulation of radiation transport. Detection system performance parameters. Design projects.

**NUC E 490: Independent Study**

Cr. 1-3. Repeatable, maximum of 3 credits.

*Prereq: Junior Classification*

Investigation of nuclear engineering topics. Election of course and topic must be approved in advance by supervising faculty.