

# Nuclear Engineering

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## Overview

The Department of Nuclear Engineering was established in 1958. There are currently about 78 graduate students in the department. Graduates find opportunities for employment and professional careers in the United States and abroad. Recent graduates are employed in academia, industry, national laboratories, and state and federal agencies.

The Nuclear Engineering program is comprised of classroom and laboratory instruction at the undergraduate and graduate levels and a strong, diverse research program. The projects are part of the department's ongoing mission to provide an education to individuals who will make key contributions and become future leaders serving California and the nation by improving and applying nuclear science and technology. The department's research areas include applied nuclear physics; bionuclear and radiological physics; computational methods; energy systems and the environment; ethics and the impact of technology on society; fission reactor design; fuel cycles and radioactive waste; plasma fusion science and technology; laser, particle beam, and plasma technologies; nuclear materials and chemistry; nuclear thermal hydraulics; risk, safety, and large-scale systems analysis, and nonproliferation.

The department has strong relations with the nearby Ernest Orlando Lawrence Berkeley National Laboratory (<http://lbl.gov>), Lawrence Livermore National Laboratory (<http://www.llnl.gov>), and Los Alamos National Laboratory (<http://www.lanl.gov>). A number of faculty and students collaborate with researchers in these laboratories, and use the facilities of these laboratories in their research projects.

## Other Resources

The department hosts a Monday colloquium series during the academic year. For further information and the schedule, please see the department's website (<https://www.nuc.berkeley.edu/colloquiums>).

The department sponsors the Rad Watch project (<http://radwatch.berkeley.edu>). The department has been performing a large range of radiation measurements starting in March 2011, following the releases of radioactive materials from the Daiichi Nuclear Power Plant in Japan. One of the goals of this activity was to measure the radioactivity in Californian samples that could potentially be associated with the releases in Japan using state-of-the-art experiments, to publish the data without filter or restriction, and to put the results in the context of the radiation we are exposed to in our daily lives. In response to the resurgent interest in radiation levels due to the expected arrival of cesium at the North American west coast, we are increasing our efforts again to measure samples potentially affected by the Pacific Ocean current transport. In addition to measurements samples of fish, seaweed, crab, etc., we are part of the Kelp Watch 2014 initiative (<http://kelpwatch.berkeley.edu>), which aims at measuring a potential cesium uptake into kelp over the next year.

## Undergraduate Programs

Nuclear Engineering (<http://guide.berkeley.edu/undergraduate/degree-programs/nuclear-engineering>): BS, Minor

Chemical Engineering/Nuclear Engineering (<http://guide.berkeley.edu/undergraduate/degree-programs/chemical-engineering-nuclear-joint-major>): BS (Joint Major in conjunction with the College of Chemistry)

Electrical Engineering and Computer Sciences/Nuclear Engineering (<http://guide.berkeley.edu/undergraduate/degree-programs/electrical-engineering-computer-sciences-nuclear-joint-major>): BS (Joint Major)

Materials Science and Engineering/Nuclear Engineering (<http://guide.berkeley.edu/undergraduate/degree-programs/materials-science-engineering-nuclear-joint-major>): BS (Joint Major)

Mechanical Engineering/Nuclear Engineering (<http://guide.berkeley.edu/undergraduate/degree-programs/mechanical-engineering-nuclear>): BS (Joint Major)

## Graduate Programs

Nuclear Engineering (<http://guide.berkeley.edu/graduate/degree-programs/nuclear-engineering>): MEng, MS/MPP, PhD

## Nuclear Engineering

### NUC ENG 24 Freshman Seminars 1 Unit

Terms offered: Spring 2018, Fall 2017, Spring 2017

The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.

Freshman Seminars: [Read More \[+\]](#)

#### Rules & Requirements

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

#### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of seminar per week

#### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminars: [Read Less \[-\]](#)

## NUC ENG 100 Introduction to Nuclear Engineering 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

The class provides students with an overview of the contemporary nuclear energy technology with emphasis on nuclear fission as an energy source. Starting with the basic physics of the nuclear fission process, the class includes discussions on reactor control, thermal hydraulics, fuel production, and spent fuel management for various types of reactors in use around the world as well as analysis of safety and other nuclear-related issues. This class is intended for sophomore NE students, but is also open to transfer students and students from other majors.

Introduction to Nuclear Engineering: [Read More \[+\]](#)

### Rules & Requirements

**Prerequisites:** Physics 7A and 7B, Physics 7C may be taken concurrently. Mathematics 53 and 54 may be taken concurrently

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

Introduction to Nuclear Engineering: [Read Less \[-\]](#)

## NUC ENG 101 Nuclear Reactions and Radiation 4 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

Energetics and kinetics of nuclear reactions and radioactive decay, fission, fusion, and reactions of low-energy neutrons; properties of the fission products and the actinides; nuclear models and transition probabilities; interaction of radiation with matter.

Nuclear Reactions and Radiation: [Read More \[+\]](#)

### Rules & Requirements

**Prerequisites:** Physics 7C

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructors:** Bernstein, L.

Nuclear Reactions and Radiation: [Read Less \[-\]](#)

## NUC ENG 102 Nuclear Reactions and Radiation Laboratory 3 Units

Terms offered: Spring 2016, Spring 2015, Spring 2013

Laboratory course in nuclear physics. Experiments will allow students to directly observe phenomena discussed in Nuclear Engineering 101. These experiments will give students exposure to (1) electronics, (2) alpha, beta, gamma radiation detectors, (3) radioactive sources, and (4) experimental methods relevant for all aspects of nuclear science. Experiments include: Rutherford scattering, x-ray fluorescence, muon lifetime, gamma-gamma angular correlations, Mossbauer effect, and radon measurements.

Nuclear Reactions and Radiation Laboratory: [Read More \[+\]](#)

### Rules & Requirements

**Prerequisites:** 101

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of lecture, 1 hour of discussion, and 4 hours of laboratory per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Norman

Nuclear Reactions and Radiation Laboratory: [Read Less \[-\]](#)

## NUC ENG 104 Radiation Detection and Nuclear Instrumentation Laboratory 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Basic science of radiation measurement, nuclear instrumentation, neutronics, radiation dosimetry. The lectures emphasize the principles of radiation detection. The weekly laboratory applies a variety of radiation detection systems to the practical measurements of interest for nuclear power, nuclear and non-nuclear science, and environmental applications. Students present goals and approaches of the experiments being performed.

Radiation Detection and Nuclear Instrumentation Laboratory: [Read More \[+\]](#)

### Rules & Requirements

**Prerequisites:** 101 or equivalent or consent of instructor; 150 or equivalent recommended

### Hours & Format

**Fall and/or spring:** 15 weeks - 2 hours of lecture and 4 hours of laboratory per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Vetter

**Formerly known as:** 104A

Radiation Detection and Nuclear Instrumentation Laboratory: [Read Less \[-\]](#)

## NUC ENG 107 Introduction to Imaging 3 Units

Terms offered: Fall 2016, Fall 2014, Fall 2012

Introduction to medical imaging physics and systems, including x-ray computed tomography (CT), nuclear magnetic resonance (NMR), positron emission tomography (PET), and SPECT; basic principles of tomography and an introduction to unfolding methods; resolution effects of counting statistics, inherent system resolution and human factors.

Introduction to Imaging: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** 101 and 104A or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Vetter

Introduction to Imaging: [Read Less](#) [-]

## NUC ENG 120 Nuclear Materials 4 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

Effects of irradiation on the atomic and mechanical properties of materials in nuclear reactors. Fission product swelling and release; neutron damage to structural alloys; fabrication and properties of uranium dioxide fuel.

Nuclear Materials: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Engineering 45 and an upper division course in thermodynamics

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Wirth

Nuclear Materials: [Read Less](#) [-]

## NUC ENG 124 Radioactive Waste Management 3 Units

Terms offered: Spring 2017, Spring 2016, Spring 2015

Components and material flowsheets for nuclear fuel cycle, waste characteristics, sources of radioactive wastes, compositions, radioactivity and heat generation; waste treatment technologies; waste disposal technologies; safety assessment of waste disposal.

Radioactive Waste Management: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Engineering 117 or equivalent course

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Ahn

Radioactive Waste Management: [Read Less](#) [-]

## NUC ENG 130 Analytical Methods for Non-proliferation 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Use of nuclear measurement techniques to detect clandestine movement and/or possession of nuclear materials by third parties. Nuclear detection, forensics, signatures, and active and passive interrogation methodologies will be explored. Techniques currently deployed for arms control and treaty verification will be discussed. Emphasis will be placed on common elements of detection technology from the viewpoint of resolution of threat signatures from false positives due to naturally occurring radioactive material. Topics include passive and active neutron signals, gamma ray detection, fission neutron multiplicity, and U and Pu isotopic identification and age determination.

Analytical Methods for Non-proliferation: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** 101 or equivalent course in nuclear physics, or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Morse

Analytical Methods for Non-proliferation: [Read Less](#) [-]

## NUC ENG 150 Introduction to Nuclear Reactor Theory 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016  
Neutron interactions, nuclear fission, and chain reacting systematics in thermal and fast nuclear reactors. Diffusion and slowing down of neutrons. Criticality calculations. Nuclear reactor dynamics and reactivity feedback. Production of radionuclides in nuclear reactors.  
Introduction to Nuclear Reactor Theory: Read More [+]

### Rules & Requirements

**Prerequisites:** 101; Mathematics 53 and 54

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructors:** Greenspan, Vujic

Introduction to Nuclear Reactor Theory: Read Less [-]

## NUC ENG 155 Introduction to Numerical Simulations in Radiation Transport 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016  
Computational methods used to analyze radiation transport described by various differential, integral, and integro-differential equations. Numerical methods include finite difference, finite elements, discrete ordinates, and Monte Carlo. Examples from neutron and photon transport; numerical solutions of neutron/photon diffusion and transport equations. Monte Carlo simulations of photon and neutron transport. An overview of optimization techniques for solving the resulting discrete equations on vector and parallel computer systems.  
Introduction to Numerical Simulations in Radiation Transport: Read More [+]

### Rules & Requirements

**Prerequisites:** Mathematics 53 and 54

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructors:** Vujic, Wirth

Introduction to Numerical Simulations in Radiation Transport: Read Less [-]

## NUC ENG 161 Nuclear Power Engineering 4 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015  
Energy conversion in nuclear power systems; design of fission reactors; thermal and structural analysis of reactor core and plant components; thermal-hydraulic analysis of accidents in nuclear power plants; safety evaluation and engineered safety systems.  
Nuclear Power Engineering: Read More [+]

### Rules & Requirements

**Prerequisites:** Course(s) in fluid mechanics and heat transfer; junior-level course in thermodynamics

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Peterson

Nuclear Power Engineering: Read Less [-]

## NUC ENG 162 Radiation Biophysics and Dosimetry 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016  
Interaction of radiation with matter; physical, chemical, and biological effects of radiation on human tissues; dosimetry units and measurements; internal and external radiation fields and dosimetry; radiation exposure regulations; sources of radiation and radioactivity; basic shielding concepts; elements of radiation protection and control; theories and models for cell survival, radiation sensitivity, carcinogenesis, and dose calculation.  
Radiation Biophysics and Dosimetry: Read More [+]

### Rules & Requirements

**Prerequisites:** Upper division standing or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Vujic

Radiation Biophysics and Dosimetry: Read Less [-]

## NUC ENG 167 Risk-Informed Design for Advanced Nuclear Systems 3 Units

Terms offered: Fall 2017, Fall 2015, Fall 2014

Project-based class for design and licensing of nuclear facilities, including advanced reactors. Elements of a project proposal. Regulatory framework and use of deterministic and probabilistic licensing criteria. Siting criteria. External and internal events. Identification and analysis of design basis and beyond design basis events. Communication with regulators and stakeholders. Ability to work in and contribute to a design team.

Risk-Informed Design for Advanced Nuclear Systems: [Read More](#) [+]

### Objectives Outcomes

**Course Objectives:** \* Introduce students to the methods and models for event identification, accident analysis, and risk assessment and management for internally and externally initiated events.

\* Introduce students to the regulatory requirements for design, construction and operation of nuclear facilities licensed by the U.S. Nuclear Regulatory Commission.

\* Introduce students to the safety principles and methods used to design, construct and operate a safe nuclear facility, for a specific site and application.

\* Provide a basic understanding of similarities and differences in regulation of nuclear facilities versus other technologies (biotech, commercial aviation, commercial space launch, civil infrastructure).

\* Provide a basic understanding the risk-informed design process and an opportunity to experience contributing in a focused area to a design project.

\* Provide students with experiential knowledge in developing schedules, allocating work responsibilities, and working in teams.

\* Provide students with experiential knowledge in the preparation and evaluation a Safety Analysis Report for meeting USNRC regulatory requirements, including response to Requests for Additional Information (RAIs).

**Student Learning Outcomes:** \* Develop a broad understanding of safety principles and methods used in design, construction and licensing of nuclear facilities.

\* Develop a broad understanding of the U.S. Nuclear Regulatory Commission's regulatory requirements for nuclear facilities.

\* Have awareness of key similarities and differences in regulation of nuclear facilities versus other technologies (biotech, commercial aviation, commercial space launch, civil infrastructure).

\* Have awareness of the major topics covered in a Safety Analysis Report (SAR) and experience in developing and writing at least one element of a SAR.

\* Have developed experience and skills in communication with the business community, the public, and regulators.

\* Have developed experience and skills in establishing a project schedule, allocating work responsibilities, and working in teams.

\* Have understanding of application of event identification, event frequency and consequence analysis, risk assessment and management for internally and externally initiated events in the design process.

### Rules & Requirements

**Prerequisites:** Completion of at least two upper-division engineering courses providing relevant skills: ChemE 150A, ChemE 180, CE 111, CE 120, CE152, CE 166, CE 175, E 120, IEOR 166, IEOR 172, ME 106, ME 109, ME 128, ME 146, NE 120, NE 124, NE 150, NE 161

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

## NUC ENG 170A Nuclear Design: Design in Nuclear Power Technology and Instrumentation 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Design of various fission and fusion power systems and other physically based applications. Each semester a topic will be chosen by the class as a whole. In addition to technology, the design should address issues relating to economics, the environment, and risk assessment.

Nuclear Design: Design in Nuclear Power Technology and Instrumentation: [Read More](#) [+]

Nuclear Design: Design in Nuclear Power Technology and Instrumentation: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Senior standing or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Formerly known as:** 170

Nuclear Design: Design in Nuclear Power Technology and Instrumentation: [Read Less](#) [-]

## NUC ENG 170B Nuclear Design: Design in Bionuclear, Nuclear Medicine, and Radiation Therapy 3 Units

Terms offered: Spring 2010, Spring 2009, Spring 2008

A systems approach to the development of procedures for nuclear medicine and radiation therapy. Each semester a specific procedure will be studied and will entail the development of the biological and physiological basis for a procedure, the chemical and biochemical characteristics of appropriate drugs, dosimetric requirements and limitations, the production and distribution of radionuclides and/or radiation fields to be applied, and the characteristics of the instrumentation to be used.

Nuclear Design: Design in Bionuclear, Nuclear Medicine, and Radiation Therapy: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** 107, 161, or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Formerly known as:** 167

Nuclear Design: Design in Bionuclear, Nuclear Medicine, and Radiation Therapy: [Read Less](#) [-]

## NUC ENG 175 Methods of Risk Analysis 3 Units

Terms offered: Fall 2013, Fall 2011, Fall 2009

Methodological approaches for the quantification of technological risk and risk based decision making. Probabilistic safety assessment, human health risks, environmental and ecological risk analysis.

Methods of Risk Analysis: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Upper division standing

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Kastenberg

Methods of Risk Analysis: [Read Less](#) [-]

## NUC ENG 180 Introduction to Controlled Fusion 3 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

Introduction to energy production by controlled thermonuclear reactions. Nuclear fusion reactions, energy balances for fusion systems, survey of plasma physics; neutral beam injection; RF heating methods; vacuum systems; tritium handling.

Introduction to Controlled Fusion: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Physics 7C

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam required.

**Instructor:** Morse

Introduction to Controlled Fusion: [Read Less](#) [-]

## NUC ENG H194 Honors Undergraduate Research 1 - 4 Units

Terms offered: Spring 2018, Fall 2017, Spring 2017

Supervised research. Students who have completed three or more upper division courses may pursue original research under the direction of one of the members of the staff. A final report or presentation is required. A maximum of three units of H194 may be used to fulfill a technical elective requirement in the Nuclear Engineering general program or joint major programs.

Honors Undergraduate Research: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Upper division technical GPA of 3.3, consent of instructor and faculty advisor

**Repeat rules:** Course may be repeated for credit up to a total of 8 units. Course may be repeated for a maximum of 8 units.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1-4 hours of independent study per week

**Summer:** 10 weeks - 1.5-6 hours of independent study per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Letter grade. Final exam not required.

Honors Undergraduate Research: [Read Less](#) [-]

## NUC ENG 198 Group Study for Advanced Undergraduates 1 - 4 Units

Terms offered: Spring 2018, Fall 2017, Spring 2017

Group studies of selected topics.

Group Study for Advanced Undergraduates: [Read More](#) [+]

### Rules & Requirements

**Prerequisites:** Upper division standing

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1-4 hours of directed group study per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Offered for pass/not pass grade only. Final exam not required.

Group Study for Advanced Undergraduates: [Read Less](#) [-]

## NUC ENG 199 Supervised Independent Study 1 - 4 Units

Terms offered: Spring 2018, Fall 2017, Spring 2017

Supervised independent study. Enrollment restrictions apply; see the Introduction to Courses and Curricula section of this catalog.

Supervised Independent Study: Read More [+]

### Rules & Requirements

**Prerequisites:** Consent of instructor and major adviser

**Credit Restrictions:** Course may be repeated for credit for a maximum of 4 units per semester.

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 0 hours of independent study per week

#### Summer:

6 weeks - 1-5 hours of independent study per week

8 weeks - 1-4 hours of independent study per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study: Read Less [-]

## NUC ENG S199 Supervised Independent Study 1 - 4 Units

Terms offered: Prior to 2007

Supervised independent study. Please see section of the for description and prerequisites.

Supervised Independent Study: Read More [+]

### Rules & Requirements

**Prerequisites:** Consent of instructor and major adviser

**Credit Restrictions:** Course may be repeated for credit for a maximum of 4 units per semester.

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Summer:** 8 weeks - 0 hours of independent study per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Undergraduate

**Grading/Final exam status:** Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study: Read Less [-]

## NUC ENG 200M Introduction to Nuclear Engineering 3 Units

Terms offered: Spring 2018, Spring 2017

Overview of the elements of nuclear technology in use today for the production of energy and other radiation applications. Emphasis is on nuclear fission as an energy source, with a study of the basic physics of the nuclear fission process followed by detailed discussions of issues related to the control, radioactivity management, thermal energy management, fuel production, and spent fuel management. A discussion of the various reactor types in use around the world will include analysis of safety and nuclear proliferation issues surrounding the various technologies. Case studies of some reactor accidents and other nuclear-related incidents will be included.

Introduction to Nuclear Engineering: Read More [+]

### Objectives Outcomes

**Course Objectives:** (1) To give students an understanding of the basic concepts of nuclear energy and other radiation applications, together with an overview of related aspects such as proliferation and waste management.

(2) To provide students an overview of the elements of nuclear technology in use today for the production of energy and to set those elements in the broader context of nuclear technology.

**Student Learning Outcomes:** At the end of the course, students should be able to:

- understand basic theoretical concepts of nuclear physics, reactor physics, and energy removal
- describe radiation damage mechanisms in materials and biological tissue, estimate radiation dose, understand radiation shielding
- understand the concepts of chain reaction, neutron balance, criticality, reactivity, and reactivity control
- describe the main nuclear power reactor designs and identify their major components
- describe core components and understand their function
- calculate cost of electricity based on simple economic principles
- describe the difference between PWR and BWR in terms of core design, steam cycle, and operation
- understand the concept of design-basis accidents, their causes, and their consequences
- identify the main steps and related facilities of fuel cycle
- understand the fundamental aspects of used fuel reprocessing and disposal

### Rules & Requirements

**Prerequisites:** Students taking the class should have completed the equivalents of the Physics 7<BR/>sequence and the Mathematics 50 sequence or consent of instructor

**Credit Restrictions:** This course is restricted to students enrolled in the Master of Engineering degree program who may not use more than two "200M-level" courses towards their degree. Students will receive no credit for NE 200M after taking NE 100.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Fratoni

Introduction to Nuclear Engineering: Read Less [-]

## NUC ENG 201 Nuclear Reactions and Interactions of Radiation with Matter 4 Units

Terms offered: Spring 2018, Spring 2016, Spring 2014  
Interaction of gamma rays, neutrons, and charged particles with matter; nuclear structure and radioactive decay; cross sections and energetics of nuclear reactions; nuclear fission and the fission products; fission and fusion reactions as energy sources.

Nuclear Reactions and Interactions of Radiation with Matter: Read More [+]

### Rules & Requirements

**Prerequisites:** 101

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Norman

Nuclear Reactions and Interactions of Radiation with Matter: Read Less [-]

## NUC ENG 204 Advanced Concepts in Radiation Detection and Measurements 3 Units

Terms offered: Spring 2018, Fall 2015, Fall 2013  
Advanced concepts in the detection of ionizing radiation relevant for basic and applied sciences, nuclear non-proliferation, and homeland security. Concepts of signal generation and processing with advantages and drawbacks of a range of detection technologies. Laboratory comprises experiments to compare conventional analog and advanced digital signal processing, information generation and processing, position-sensitive detection, tracking, and imaging modalities.

Advanced Concepts in Radiation Detection and Measurements: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing, 104 or similar course or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 2 hours of lecture and 4 hours of laboratory per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Vetter

Advanced Concepts in Radiation Detection and Measurements: Read Less [-]

## NUC ENG 220 Irradiation Effects in Nuclear Materials 3 Units

Terms offered: Spring 2017, Spring 2015, Spring 2013  
Physical aspects and computer simulation of radiation damage in metals. Void swelling and irradiation creep. Mechanical analysis of structures under irradiation. Sputtering, blistering, and hydrogen behavior in fusion reactor materials.

Irradiation Effects in Nuclear Materials: Read More [+]

### Rules & Requirements

**Prerequisites:** 120 or consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Wirth

Irradiation Effects in Nuclear Materials: Read Less [-]

## NUC ENG 221 Corrosion in Nuclear Power Systems 3 Units

Terms offered: Spring 2018, Spring 2016, Spring 2014  
Structural metals in nuclear power plants; properties and fabrication of Zircaloy; aqueous corrosion of reactor components; structural integrity of reactor components under combined mechanical loading, neutron irradiation, and chemical environment.

Corrosion in Nuclear Power Systems: Read More [+]

### Rules & Requirements

**Prerequisites:** 120, Materials Science and Mineral Engineering 112 recommended

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Wirth

Corrosion in Nuclear Power Systems: Read Less [-]

## NUC ENG 224 Safety Assessment for Geological Disposal of Radioactive Wastes 3 Units

Terms offered: Spring 2014, Spring 2013, Spring 2012

Multi-barrier concept; groundwater hydrology, mathematical modeling of mass transport in heterogeneous media, source term for far-field model; near-field chemical environment, radionuclide release from waste solids, modeling of radionuclide transport in the near field, effect of temperature on repository performance, effect of water flow, effect of geochemical conditions, effect of engineered barrier alteration; overall performance assessment, performance index, uncertainty associated with assessment, regulation and standards.

Safety Assessment for Geological Disposal of Radioactive Wastes: Read More [+]

### Rules & Requirements

**Prerequisites:** 124 or upper division course in differential equations

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Ahn

Safety Assessment for Geological Disposal of Radioactive Wastes: Read Less [-]

## NUC ENG 225 The Nuclear Fuel Cycle 3 Units

Terms offered: Spring 2015, Spring 2013, Spring 2011

This course is intended for graduate students interested in acquiring a foundation in nuclear fuel cycle with topics ranging from nuclear-fuel reprocessing to waste treatment and final disposal. The emphasis is on the relationship between nuclear-power utilization and its environmental impacts. The goal is for graduate engineering students to gain sufficient understanding in how nuclear-power utilization affects the environment, so that they are better prepared to design an advanced system that would result in minimized environmental impact. The lectures will consist of two parts. The first half includes mathematical models for individual processes in a fuel cycle, such as nuclear fuel reprocessing, waste solidification, repository performance, and nuclear transmutation in a nuclear reactor. In the second half, these individual models are integrated, which enables students to evaluate environmental impact of a fuel cycle.

The Nuclear Fuel Cycle: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor; 124 and 150 are recommended

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Ahn

The Nuclear Fuel Cycle: Read Less [-]

## NUC ENG 230 Analytical Methods for Non-Proliferation 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Use of nuclear measurement techniques to detect clandestine movement and/or possession of nuclear materials by third parties.

Nuclear detection, forensics, signatures, and active and passive interrogation methodologies will be explored. Techniques currently deployed for arms control and treaty verification will be discussed.

Emphasis will be placed on common elements of detection technology from the viewpoint of resolution of threat signatures from false positives due to naturally occurring

radioactive material. Topics include passive and active neutron signals, gamma ray detection, fission neutron multiplicity, and U and Pu isotopic identification and age determination.

Analytical Methods for Non-Proliferation: Read More [+]

### Rules & Requirements

**Prerequisites:** 101, Physics 7C, or equivalent course in nuclear physics

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Morse

Analytical Methods for Non-Proliferation: Read Less [-]

## NUC ENG 250 Nuclear Reactor Theory 4 Units

Terms offered: Fall 2017, Fall 2015, Fall 2013

Fission characteristics; neutron chain reactions, neutron transport and diffusion theory; reactor kinetics; multigroup methods, fast and thermal spectrum calculations, inhomogeneous reactor design, effects of poisons and fuel depletion.

Nuclear Reactor Theory: Read More [+]

### Rules & Requirements

**Prerequisites:** 101, 150; Engineering 117 recommended

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture per week

**Summer:** 6 weeks - 10 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Greenspan

Nuclear Reactor Theory: Read Less [-]

## NUC ENG 255 Numerical Simulation in Radiation Transport 3 Units

Terms offered: Fall 2016, Fall 2014, Fall 2012

Computational methods used to analyze nuclear reactor systems described by various differential, integral, and integro-differential equations. Numerical methods include finite difference, finite elements, discrete ordinates, and Monte Carlo. Examples from neutron and photon transport, heat transfer, and thermal hydraulics. An overview of optimization techniques for solving the resulting discrete equations on vector and parallel computer systems.

Numerical Simulation in Radiation Transport: Read More [+]

### Rules & Requirements

**Prerequisites:** 150

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Vujic

Numerical Simulation in Radiation Transport: Read Less [-]

## NUC ENG 260 Thermal Aspects of Nuclear Reactors 4 Units

Terms offered: Fall 2016, Fall 2014, Fall 2012

Fluid dynamics and heat transfer; thermal and hydraulic analysis of nuclear reactors; two-phase flow and boiling; compressible flow; stress analysis; energy conversion methods.

Thermal Aspects of Nuclear Reactors: Read More [+]

### Rules & Requirements

**Prerequisites:** Mechanical Engineering 106 and 109 or Chemical Engineering 150B

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Peterson

Thermal Aspects of Nuclear Reactors: Read Less [-]

## NUC ENG 262 Radiobiology 3 Units

Terms offered: Prior to 2007

Radiobiology is concerned with the action of ionizing radiation on biological tissues and living organisms. It combines two disciplines: radiation physics and biology. Radiobiology combines our understanding of ionizing radiation and molecular biology, and is a required knowledge for health physicists, radiation biologists and medical physicists. This course will provide such knowledge for a diverse group of students with need in either disciplines. This course represents one of the requisites for the Joint UC Berkeley-UC San Francisco Medical Physics Certificate Program.

Radiobiology: Read More [+]

### Objectives Outcomes

**Course Objectives:** A group project will be expected from students and computer models will be turned in at the end of the semester, either focusing on cancer risk tools, epidemiologic analysis, radiation cancer models or cancer treatment by radiation. The project should give students strong foundation to tackle more advanced risk models or dynamic cancer models.

They will be exposed to the multi-scale complexity of the tissue response to ionizing radiation from the whole organism to individual cells and down to the DNA. Molecular biology describing the cellular response and the DNA repair mechanisms will be covered, with an emphasis on cell kinetics such as recovery processes and cell cycle sensitivity. The overall tissue response will also be discussed with an effort to distinguish acute and delayed effects. Radiation risk models and their impact on limits will be introduced and described in the context of past and current research. This course is designed for Nuclear Engineering students and in particular those pursuing a Medical Physics Certificate with knowledge essential to radiobiology. Students will learn about the history of radiation effects, epidemiology of radiation and evidence of cancer in populations.

**Student Learning Outcomes:** By the end of the class, students should:

- Be proficient in the main mechanisms describing the interaction of ionizing radiation with tissue;
- Be able to know the existing gaps in this field and where more research is needed;
- Understand how radiation affects DNA and leads to gene mutation
- Understand how cancer rises from various radiation damage in the tissue (targeted and non-targeted effects)
- Able to write computer model for radiation risk assessment
- Able to write computer model for cancer formation
- Understand the main methods to treat cancer with radiation
- Can differentiate tissue effect between low and high LET
- Understand the various risk issues dealing with radiation: occupational (medical, nuclear worker, astronauts ...), vs population (accident, terrorism ...)
- Be able to read scientific articles in the radiation biology field

### Rules & Requirements

**Prerequisites:** Students are expected to have completed a course in basic radiology, radiation protection, and dosimetry (NE162 or equivalent). In addition, a class in radiation detection and instrumentation (e.g. NE104 or equivalent) and in introductory programming (Engineering 7 or equivalent) are recommended, but not required. Prerequisites may be waived by consent of the instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

## NUC ENG 265 Design Analysis of Nuclear Reactors 3 Units

Terms offered: Fall 2016, Fall 2015, Fall 2013

Principles and techniques of economic analysis to determine capital and operating costs; fuel management and fuel cycle optimization; thermal limits on reactor performance, thermal converters, and fast breeders; control and transient problems; reactor safety and licensing; release of radioactivity from reactors and fuel processing plants.

Design Analysis of Nuclear Reactors: Read More [+]

### Rules & Requirements

**Prerequisites:** 150 and 161

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Greenspan

Design Analysis of Nuclear Reactors: Read Less [-]

## NUC ENG 267 Risk-Informed Design for Advanced Nuclear Systems 3 Units

Terms offered: Fall 2017, Fall 2015, Fall 2012

Project-based class for design and licensing of nuclear facilities, including advanced reactors. Elements of a project proposal. Regulatory framework and use of deterministic and probabilistic licensing criteria. Siting criteria. External and internal events. Identification and analysis of design basis and beyond design basis events. Communication with regulators and stakeholders. Ability to work in and contribute to a design team.

Risk-Informed Design for Advanced Nuclear Systems: Read More [+]

### Rules & Requirements

**Prerequisites:** Completion of at least two upperdivision engineering courses providing relevant skills: ChemE 150A, ChemE 180, CE 111, CE 120, CE152, CE 166, CE 175, E 120, IEOR 166, IEOR 172, ME 106, ME 109, ME 128, ME 146, Nuc Eng 120, Nuc Eng 124, Nuc Eng 150, Nuc Eng 161

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Peterson

Risk-Informed Design for Advanced Nuclear Systems: Read Less [-]

## NUC ENG 275 Principles and Methods of Risk Analysis 4 Units

Terms offered: Fall 2013, Fall 2011, Fall 2009

Principles and methodological approaches for the quantification of technological risk and risk-based decision making.

Principles and Methods of Risk Analysis: Read More [+]

### Rules & Requirements

**Prerequisites:** Consent of instructor. Civil Engineering 193 and Industrial Engineering 166 recommended

### Hours & Format

**Fall and/or spring:** 15 weeks - 4 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Kastenber

Principles and Methods of Risk Analysis: Read Less [-]

## NUC ENG 280 Fusion Reactor Engineering 3 Units

Terms offered: Spring 2017, Spring 2015, Spring 2013

Engineering and design of fusion systems. Introduction to controlled thermonuclear fusion as an energy economy, from the standpoint of the physics and technology involved. Case studies of fusion reactor design. Engineering principles of support technology for fusion systems.

Fusion Reactor Engineering: Read More [+]

### Rules & Requirements

**Prerequisites:** 120 and 180

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Morse

Fusion Reactor Engineering: Read Less [-]

## NUC ENG 281 Fully Ionized Plasmas 3 Units

Terms offered: Spring 2018, Spring 2016, Spring 2014

Introduction to warm and hot magnetized plasmas. Single particle motion in electric and magnetic fields. Collective particle oscillations, waves and instabilities. Magnetohydrodynamic equilibria, stability and transport.

Magnetically confined plasmas for controlled fusion. Space plasmas.

Fully Ionized Plasmas: Read More [+]

### Rules & Requirements

**Prerequisites:** Consent of instructor

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** Morse

**Formerly known as:** Electrical Engineering 239B

Fully Ionized Plasmas: Read Less [-]

## NUC ENG C282 Charged Particle Sources and Beam Technology 3 Units

Terms offered: Spring 2018, Fall 2015, Fall 2013, Fall 2011

Topics in this course will include the latest technology of various types of ion and electron sources, extraction and formation of charge particle beams, computer simulation of beam propagation, diagnostics of ion sources and beams, and the applications of beams in fusion, synchrotron light source, neutron generation, microelectronics, lithography, and medical therapy. This is a general accelerator technology and engineering course that will be of interest to graduate students in physics, electrical engineering, and nuclear engineering.

Charged Particle Sources and Beam Technology: Read More [+]

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructors:** Leung, Steier

**Also listed as:** ENGIN C282

Charged Particle Sources and Beam Technology: Read Less [-]

## NUC ENG C285 Nuclear Security: The Nexus Between Policy and Technology 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

The course will review the origins and evolution of nuclear energy, how it has been applied for both peaceful and military purposes, and the current and prospective challenges it presents. The purpose of the course is to educate students on the policy roots and technological foundations of nuclear energy and nuclear weapons so they are positioned to make original contributions to the field in their scholarly and professional careers.

Nuclear Security: The Nexus Between Policy and Technology: Read More [+]

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructors:** Nacht, Prussin

**Also listed as:** PUB POL C285

Nuclear Security: The Nexus Between Policy and Technology: Read Less [-]

## NUC ENG 290A Special Topics in Applied Nuclear Physics 3 Units

Terms offered: Fall 2017, Spring 2016, Fall 2014

Special topics in applied nuclear physics. Topics may include applied nuclear reactions and instrumentation, bionuclear and radiological physics, and subsurface nuclear technology, among other possibilities. Course content may vary from semester to semester depending upon the instructor.

Special Topics in Applied Nuclear Physics: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

**Instructor:** van Bibber

Special Topics in Applied Nuclear Physics: Read Less [-]

## NUC ENG 290B Special Topics in Nuclear Materials and Chemistry 3 Units

Terms offered: Spring 2016, Spring 2015, Spring 2013

Special topics in nuclear materials and chemistry. Topics may include advanced nuclear materials and corrosion. Course content may vary from semester to semester depending upon the instructor.

Special Topics in Nuclear Materials and Chemistry: Read More [+]

### Rules & Requirements

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

Special Topics in Nuclear Materials and Chemistry: Read Less [-]

## NUC ENG 290C Special Topics in Nuclear Energy 3 Units

Terms offered: Summer 2002 10 Week Session

Special topics in nuclear energy. Topics may include fission reactor analysis and engineering, nuclear thermal hydraulics, and risk, safety and large-scale systems analysis. Course content may vary from semester to semester depending on the instructor.

Special Topics in Nuclear Energy: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

Special Topics in Nuclear Energy: Read Less [-]

## NUC ENG 290D Special Topics in Nuclear Non-Proliferation 3 Units

Terms offered: Fall 2014, Summer 2005 10 Week Session, Summer 2004 10 Week Session

Special topics in nuclear non-proliferation. Topics may include homeland security and nuclear policy, and nuclear fuel cycle and waste management. Course content may vary from semester to semester depending on the instructor.

Special Topics in Nuclear Non-Proliferation: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

Special Topics in Nuclear Non-Proliferation: Read Less [-]

## NUC ENG 290E Special Topics in Environmental Aspects of Nuclear Energy 3 Units

Terms offered: Fall 2015, Fall 2014, Fall 2008

Special topics in environmental aspects of nuclear energy. Lectures on special topics of interest in environmental impacts of nuclear power utilizations, including severe accidents. The course content may vary from semester to semester, and will be announced at the beginning of each semester.

Special Topics in Environmental Aspects of Nuclear Energy: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

Special Topics in Environmental Aspects of Nuclear Energy: Read Less [-]

## NUC ENG 290F Special Topics in Fusion and Plasma Physics 3 Units

Terms offered: Summer 2007 10 Week Session, Summer 2007 3 Week Session

Special topics in fusion and plasma physics. Topics may include laser, particle beam and plasma technologies, fusion science and technology, and accelerators. Course content may vary from semester to semester depending upon the instructor.

Special Topics in Fusion and Plasma Physics: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or consent of instructor

**Repeat rules:** Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

### Hours & Format

**Fall and/or spring:** 15 weeks - 3 hours of lecture per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Letter grade.

Special Topics in Fusion and Plasma Physics: Read Less [-]

## NUC ENG 295 Nuclear Engineering Colloquium 0.0 Units

Terms offered: Spring 2018, Fall 2017, Spring 2017

Presentations on current topics of interest in nuclear technology by experts from government, industry and universities. Open to the campus community.

Nuclear Engineering Colloquium: Read More [+]

### Rules & Requirements

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of colloquium per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

**Instructor:** van Bibber

Nuclear Engineering Colloquium: Read Less [-]

## NUC ENG 298 Group Research Seminars 1 Unit

Terms offered: Spring 2018, Fall 2017, Spring 2017

Seminars in current research topics in nuclear engineering: Section 1 - Fusion; Section 2 - Nuclear Waste Management; Section 3 - Nuclear Thermal Hydraulics; Section 4 - Nuclear Chemistry; Section 6 - Nuclear Materials; Section 7 - Fusion reaction design; Section 8 - Nuclear Instrumentation.

Group Research Seminars: Read More [+]

### Rules & Requirements

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1.5 hours of seminar per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

Group Research Seminars: Read Less [-]

## NUC ENG 299 Individual Research 1 - 12 Units

Terms offered: Spring 2018, Fall 2017, Spring 2017

Investigation of advanced nuclear engineering problems.

Individual Research: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 0 hours of independent study per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

Individual Research: Read Less [-]

## NUC ENG N299 Individual Research 1 - 6 Units

Terms offered: Summer 2009 10 Week Session, Summer 2006 10 Week Session, Summer 2005 10 Week Session

Investigation of advanced nuclear engineering problems.

Individual Research: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Summer:** 8 weeks - 1-6 hours of independent study per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Graduate

**Grading:** Offered for satisfactory/unsatisfactory grade only.

Individual Research: Read Less [-]

## NUC ENG 375 Teaching Techniques in Nuclear Engineering 1 - 3 Units

Terms offered: Fall 2017, Fall 2016, Fall 2015

This course is designed to acquaint new teaching assistants with the nature of graduate student instruction in courses in the department of Nuclear Engineering. Discussion, practice, and review of issues relevant to the teaching of nuclear engineering. Effective teaching methods will be introduced by experienced GSIs and faculty.

Teaching Techniques in Nuclear Engineering: Read More [+]

### Rules & Requirements

**Prerequisites:** Graduate standing or ASE status

**Repeat rules:** Course may be repeated for credit without restriction.

### Hours & Format

**Fall and/or spring:** 15 weeks - 1 hour of lecture and 1 hour of discussion per week

### Additional Details

**Subject/Course Level:** Nuclear Engineering/Professional course for teachers or prospective teachers

**Grading:** Offered for satisfactory/unsatisfactory grade only.

**Formerly known as:** Nuclear Engineering 301

Teaching Techniques in Nuclear Engineering: Read Less [-]

## **NUC ENG 602 Individual Study for Doctoral Students 1 - 8 Units**

Terms offered: Fall 2017, Spring 2017, Fall 2016

Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D.

Individual Study for Doctoral Students: [Read More \[+\]](#)

### **Rules & Requirements**

**Prerequisites:** For candidates for doctoral degree

**Credit Restrictions:** Course does not satisfy unit or residence requirements for doctoral degree.

**Repeat rules:** Course may be repeated for credit without restriction.

### **Hours & Format**

**Fall and/or spring:** 15 weeks - 0 hours of independent study per week

### **Additional Details**

**Subject/Course Level:** Nuclear Engineering/Graduate examination preparation

**Grading:** Offered for satisfactory/unsatisfactory grade only.

Individual Study for Doctoral Students: [Read Less \[-\]](#)