

Nuclear Engineering

Nuclear engineering is the field that deals with the applications of nuclear energy and science by utilizing fission reactors, radioisotopes and, in the future, fusion reactors.

Nuclear engineers contribute to the design, construction and operation of nuclear fission reactors for the generation of electricity, the design of advanced nuclear power systems (including space power) and the application of radioisotopes in industry, medicine and research.

Currently, there are more than 100 nuclear power plants operating in the United States producing over 20 percent of our nation's electricity and using nuclear fission to produce this energy. This technology reduces emissions of carbon dioxide, the primary greenhouse gas, by about 20 percent each year.

In addition, nuclear reactors are used for the propulsion of submarines and aircraft carriers. Radioisotopes are used in industry and research and in medicine for diagnostic and therapeutic purposes. The medical use of radioisotopes and X-rays saves hundreds of thousands of lives every year throughout the world. Radioisotopes are also used in small power generators for space missions. All deep space missions use communication systems that are powered by Radioisotope Thermoelectric Generators (RTGs).

Missouri S&T's ABET-accredited program combines basic science and engineering principles with a strong emphasis in design and a solid technical knowledge. One of the nation's first undergraduate programs, the nuclear engineering department at Missouri S&T continues to be a national leader in the field.

Scholarship Information

Freshman scholarships are awarded based on high school transcripts and ACT/SAT scores. Some may require a separate application. Scholarships ranging from \$500 to \$4,000 for sophomores, juniors and seniors typically require an application and are based on academic record, service activities and extracurricular activities.

Student Organizations and Undergraduate Research

Undergraduate research opportunities are available through the Opportunities for Undergraduate Research program as well as many faculty-sponsored projects. Nuclear Engineering faculty works with faculty members from several other disciplines on interdisciplinary engineering research projects. There is a student chapter of the American Nuclear Society.

Entry Level Job Titles

S&T graduates work for the following types of companies:

- electrical power companies
(Union Electric, Commonwealth Edison,...)
- reactor manufacturers
(General Electric, Westinghouse,...)
- architect-engineering firms
(Bechtel,...)
- consulting firms
(Black & Veatch,...)
- national laboratories
(Argonne, Battelle, Los Alamos, Oak Ridge,...)
- federal government
(CIA, DOD, DOE, EPA, FBI, NRC,...)

Co-op and Internship Availability

Co-op and summer intern programs are available to students. These programs provide students with the opportunity to integrate their classroom studies with learning through productive work experiences in a field related to a student's academic or career goals. Work for a semester or over a summer to build your resume.

Facilities

Fulton Hall houses the department offices, classrooms and teaching and research laboratories. The laboratories include a Nuclear Reactor Facility (housed in a separate building), a radiation measurement laboratory, a two phase flow and thermal hydraulics laboratory and a computer learning center.

Computing facilities available in the department include UNIX workstations and Dell and Macintosh personal computers. Nuclear engineering students have off-hours access to the computer learning center.

Departmental Contact Information:

Department Chair:	Dr. Samuel Frimpong
Program Head:	Dr. Arvind Kumar
573-341-4573	226 McNutt Hall
mne.mst.edu	nuclear@mst.edu

Faculty

Professors:

Arvind Kumar, Ph.D., California-Berkeley
 Samuel Frimpong¹, Ph.D., Alberta (Chair)

Associate Professors:

Gary Mueller¹, Ph.D., Missouri S&T
 Hyoung Koo Lee, Ph.D., California-Berkeley
 Shoab Usman, Ph.D., Cincinnati

Assistant Professors:

Carlos Castano, Ph.D., Illinois
 Ayodeji Alajo, Ph.D., Texas A&M University
 Xin Liu, Ph.D., Wisconsin

Adjunct Faculty:

Mariesa Crow¹, Ph.D., Illinois
 Tod Moser¹, M.S., Missouri-Columbia, Manager Plant Engineering, AmerenUE
 Callaway Nuclear Plant, Fulton, Missouri
 David Summers, Ph.D., Leeds, England

Emeritus Faculty:

Delbert Day¹ (Curators¹), Ph.D., Penn State
 D. Ray Edwards¹, Sc.D., MIT
 Nicholas Tsoulfanidis¹, Ph.D., Illinois

Registered Professional Engineer

Minor Programs and Available Emphasis Areas

A nuclear engineering minor is available. Nuclear engineering students may choose an emphasis area for their degree in the following areas:

- radiation effects/nuclear materials
- space nuclear power
- radiation protection (or health physics)
- heat transfer/fluid flow
- nuclear fuels
- reactor diagnostics/artificial intelligence
- radioactive waste management/environmental restoration
- neutronics

Notes

Detailed information on course equivalencies, acceptable credits for elective coursework, grade requirements and prerequisites is available from S&T's Registrar's Office at registrar.mst.edu.

All nuclear engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade is not required; however, this is the first step to becoming a registered professional engineer.

Bachelor of Science

Nuclear Engineering.....128 credit hours

Entering freshmen desiring to study nuclear engineering are admitted to the Freshman Engineering Program. They may, however, state a Nuclear Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the Freshmen Engineering program is on enhanced advising and career counseling, with the goal of providing to the student the information necessary to make an informed decision.

FIRST YEAR	Credit
FE 1100-Careers in Engineering.....	1
MechE 1720-Engineering Design	3
Chemistry 1310, 1319 -or- Chemistry 1100, 1351	5
English 1120-Exposition.....	3
Math 1214-Calculus for Engineers I.....	4
Math 1215-Calculus for Engineers II.....	4
Physics 1135-Engineering Physics I.....	4
History 1200, 1300, 1310, or Political Science 1200.....	3
Elective/Humanities or Social Science.....	3
NucE 1105-Nuclear Technology Applications	1
	31

SECOND YEAR

CmpSci 3200-Intro to Numerical Methods.....	3
CmpSci 1970/1980 or 1971/1981-Computer Programming w/ Lab.....	3
Economics 1100 or 1200-Micro or Macroeconomics	3
CivE 2210-Mechanics of Materials	3
CivE 2200-Engr Mech/Statistics	3
Math 3304-Differential Equations.....	3
Math 2222-Calculus III w/ Analytic Geometry.....	4
NucE 2105-Intro to Nuclear Engineering	2
NucE 3103-Interactions of Radiation & Matter -or- Physics 2305-Intro to Modern Physics	3
NucE 2406-Reactor Operations I	1
Physics 2135-Engineering Physics II	4
	32

THIRD YEAR

English 3560-Technical Writing.....	3
MetE 2110-Metallurgy for Engineers.....	3
NucE 3205-Fundamentals of Nuc Engineering.....	3
NucE 3221-Reactor Fluid Mechanics	3
NucE 3223-Reactor Heat Transfer.....	3
NucE 4203-Reactor Physics I.....	3
NucE 4312-Nuc Radiation Measurement & Spectroscopy.....	3
NucE 4229-Nuclear Power Plant Systems.....	3
Statistics 3115-Engineering Statistics.....	3
Elective/Humanities or Social Science.....	3
Technical Elective/ 3000 or 4000 level	3
	33

FOURTH YEAR

NucE 4428-Reactor Lab I.....	2
NucE 4207-Nuclear Fuel Cycle	3
NucE 4438-Reactor Lab II	2
NucE 4496-Nuclear System Design I.....	1
NucE 4497-Nuclear System Design II.....	3
NucE 4241-Nuclear Materials I.....	3
Elective/4000 level Math	3
Elective/4000 level Engineering.....	3
Elective/Free.....	6
Elective/Humanities or Social Science.....	3
Elective/Humanities or Social Science.....	3
	32