

k-state

study guide

kansas state university

Mechanical and Nuclear Engineering

K-State's Department of Mechanical and Nuclear Engineering offers undergraduate degrees in:

- ▶ Mechanical engineering
- ▶ Mechanical engineering with a nuclear option

Career opportunities

As designers and innovators, mechanical and nuclear engineers combine science and mathematics to benefit humankind. Mechanical engineering is a broad-based profession, and graduates are employed in a range of industries such as aerospace, automotive, power generation, petroleum production, petrochemical processing, computer, mining, materials processing, agricultural machinery, construction machinery, robotics, military hardware, food processing, and environmental control.

Nuclear engineers find employment in nuclear power plant design, construction, or operation; nuclear medicine and health physics; radiation applications such as forensics and food processing; and research at national laboratories.

Graduates of the department find jobs in:

Research and development

Working as part of a team to find new uses for technological discoveries.

Design

Creating a component, system, or process to meet desired needs.

Manufacturing

Devising new or improved production processes for the manufacture of components, machines, or systems.

Sales

Representing the company providing technical assistance to the customer.

Management

Dealing with human problems, business decisions, and long-range planning as associated with technical activities. About 40 percent of all industry executives are engineers.

Consulting

Using their expertise as specialists in one or more branches of engineering and helping others with their technical problems.

Nuclear engineering option

Students in the mechanical engineering program may pursue a formal option in nuclear engineering. Students who follow the nuclear engineering option substitute the courses listed below for four of the technical electives in the curriculum:

- ▶ Principles of Radiation Detection
- ▶ Radiation Protection and Shielding
- ▶ Nuclear Reactor Theory
- ▶ Nuclear Reactor Lab

Facilities

Mechanical and nuclear engineering facilities are located in the engineering complex including Rathbone Hall, Seaton Hall, and Ward Hall. Laboratory experience is an important part of mechanical and nuclear engineering education, and a number of well-equipped laboratories are available: subsonic wind tunnel, internal combustion engines, composite materials, automatic controls, measurements and instruments, experimentation and design, and materials testing. In addition, a variety of modern computing facilities are available.

Specialized nuclear facilities include a 1,250-kilowatt TRIGA Mark II reactor, the InterDisciplinary Engineering and Applied Systems laboratory, the Radiation Measurement Applications (RMA) laboratory, the Semiconductor Materials and Radiological Testing (SMART) laboratory, radiation exposure facilities, neutron activation analysis laboratory, and a nuclear instrumentation laboratory.

Preparation

High school students interested in mechanical or nuclear engineering should take a college preparatory program. Though not required for entrance, high school courses in chemistry and physics are highly recommended. English and speech courses are important because effective communication is essential to an engineer. Mathematics entrance requirements include two units of algebra, one unit of geometry, and one-half unit of trigonometry (or the equivalent work in advanced math courses).

Those who have not completed these math courses will be permitted to take make-up courses. Advanced placement is possible in such subjects as chemistry, mathematics, and speech. Check with your high school counselor for information.

Curriculum

The basic sciences of physics, chemistry, and mathematics are the foundation of the bachelor of science degree in mechanical engineering. Courses in these areas are taken during your freshman and sophomore years. Engineering science courses are phased in during your sophomore year and continue into your junior year.

Engineering application courses begin during your junior year and make up the bulk of the courses during your senior year. Because of the broad and fundamental nature of the curriculum, mechanical engineering provides an excellent background for careers in fields other than engineering, including business management, law, or medicine.

Bachelor of science in mechanical engineering

(127 hours)

Freshman

Hrs.	Fall semester
4	MATH 220 Analytical Geometry and Calculus I
4	CHM 210 Chemistry I
3	ENGL 100 Expository Writing I
2	ME 101 Introduction to Mechanical Engineering
3	Humanities or social science elective*
16	
Hrs.	Spring semester
4	MATH 221 Analytical Geometry and Calculus II
5	PHYS 213 Engineering Physics I
2	SPCH 105 Public Speaking IA
3	ECON 110 Principles of Macroeconomics
2	ME 212 Engineering Graphics
16	

Sophomore

Hrs.	Fall semester
4	MATH 222 Analytical Geometry and Calculus III
5	PHYS 214 Engineering Physics II
2	IMSE 250 Introduction to Manufacturing Processes and Systems
2	CHE 352 Structural Materials
3	CE 333 Statics
16	
Hrs.	Spring semester
4	MATH 240 Elementary Differential Equations
3	ME 512 Dynamics
3	ME 513 Thermodynamics I
3	NE 495 Elements of Nuclear Engineering
3	Humanities and social science elective*
16	

Junior

Hrs.	Fall semester
3	CE 533 Mechanics of Materials
4	EECE 519 Electric Circuits and Control
3	MATH 551 Applied Matrix Theory
3	ME 400 Computer Applications in Mechanical Engineering
3	Technical elective**
or	
3	NE 690 Radiation Protection and Shielding***
16	

Hrs.	Spring semester
3	ME 533 Machine Design I
4	ME 570 Control of Mechanical Systems I
3	ME 571 Fluid Mechanics
3	Technical elective**
3	ME 535 Measurement and Instrumentation Lab
or	
3	NE 612 Principles of Radiation Detection***
16	
Senior	
Hrs.	Fall semester
2	IMSE 530 Engineering Economic Analysis
3	ME 574 Interdisciplinary Industrial Design Projects I
3	Technical elective**
3	Technical elective**
or	
3	NE 630 Nuclear Reactor Theory***
3	ENGL 415 Written Communication for Engineers
2	Humanities or social science elective*
16	
Hrs.	Spring semester
3	ME 573 Heat Transfer
3	ME 575 Interdisciplinary Industrial Design Projects II
3	Technical elective**
3	Technical elective**
or	
3	NE 648 Nuclear Reactor Lab
3	Humanities or social science elective***
15	

*Humanities and social science electives are selected from approved lists.

**Technical electives are chosen from mechanical and nuclear engineering, College of Engineering, math, chemistry, physics, biology, business administration, and statistics classes.

***Nuclear engineering option.

Student activities

Mechanical and nuclear engineering students are active in the following technical organizations: American Society of Mechanical Engineers; American Nuclear Society; American Institute of Aeronautics and Astronautics; Society of Automotive Engineers; American Society of Heating, Refrigerating, and Air Conditioning Engineers; and the Society of Manufacturing Engineers. Additionally, mechanical and nuclear engineering students participate in many national competitions including SAE Mini Baja; Formula SAE; SAE Aero Design; solar car; and other individual and team technical contests.

Dual degree program

Those who wish to do so may enroll in a dual-degree program. The second degree is usually completed with only one additional year of study. There are no minimum semester hours required, but the requirements for both degrees must be satisfied. The second degree may be in another engineering curriculum or in business administration, mathematics, physics, chemistry, or computer science.

Mechanical engineering can also serve as a pre-law or pre-medical curriculum. These programs must be carefully planned and arranged in advance.

Graduate study

The Department of Mechanical and Nuclear Engineering offers programs leading to master of science and doctor of philosophy degrees.

For more information about mechanical and nuclear engineering, contact:

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