Introduction to Nuclear Energy

Catalog Description
Atomic and nuclear structure, nuclear stability and radioactivity, nuclear reactions, detection and measurement of radiation, interaction of radiation with matter, radiation doses and hazard assessment, principles of nuclear reactors, and applications of nuclear technology.

Prerequisites
CHEM 111G

Textbook

Course Objectives
To provide engineering students with a fundamental understanding of nuclear energy.
This course addresses the following student outcomes from ABET Criterion 3:
(a) Ability to apply knowledge of mathematics, science, and engineering;
(e) Ability to identify, formulate, and solve engineering problems;
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, and societal context;
(j) Knowledge of contemporary issues.

Students successfully completing this course will demonstrate the ability to do the following:

1. Basic Concepts. Write and explain the meanings of the basic equations related to nuclear power generation. [ABET Outcome 3(a)]

2. Problem Solving. Formulate mathematical models and solve problems involving nuclear processes. [ABET Outcomes 3(a)(e)]

3. Social and Economic Effects. Discuss the environmental, social, and economic implications of nuclear power systems. [ABET Outcome 3(h)]

4. Contemporary issues. Summarize current controversies surrounding the application of nuclear energy. [ABET Outcome 3(j)]

Topics Covered
Modern physics concepts
Atomic/nuclear models
Nuclear energetics
Radioactivity
Binary nuclear reactions
Radiation interactions with matter

Radiation dosimetry
Radiation hazards
Nuclear reactors
Energy conversion devices
Environmental effects
Social and political concerns
Class/Laboratory Schedule

Instructor
P. K. Andersen
Department of Chemical and Materials Engineering
Institute for Energy and the Environment
EC III Room 331
646-8153

Office Hours
Office hours will be posted on the course Canvas site.

Grading Policies
The following weighting scheme will be used to assign final course grades:
• In-class quizzes: approximately 80%
• Online discussions and assignments: approximately 20%
Grades will be assigned according to a straight scale: 90 to 100% earns an A, 80–90% a B, and so on.
Late work will not be accepted for a grade. Missed work may be excused in cases of illness, accidents, or other emergencies.

Canvas Site
Please check the course Canvas site daily for announcements and course material. Also use the Canvas site to communicate with the course instructor.
To learn more about Canvas, see the website //studenttech.nmsu.edu/learnmsuedu/.

Syllabus Preparation Date
Revised on 20 August 2015 by P. K. Andersen

The NMSU Department of Chemical and Materials Engineering maintains an online syllabus addendum containing course requirements common to all courses with the CHME prefix. This document is accessible at http://chemeng.nmsu.edu/che_courses.htm