

School of Management, Engineering and Technology
Department of Electrical Engineering and Renewable Energy
REE 344: Nuclear Energy

Catalogue Description (2009/2010):	Introduction to nuclear energy. Atomic and nuclear physics; the interaction of radiation and matter. Nuclear reactor operation; reactor components, nuclear cycles, neutron diffusion and moderation. Reactor shielding. Fuel reprocessing and waste disposal. Reactor licensing and safety. Economics and environmental concerns.		
Hours/Credits: (Lecture-Lab-Total)	(3-0-3)		
Class Schedule:	Once weekly 190 minute lecture, one term eight-week term (Summer)		
Prerequisites:	CHE 222, PHY 223		
Required Text:	DOE Fundamentals Handbook, "Nuclear Physics and Reactor Theory," Vol. 1 and 2, 1993		
Reference Text:	J.R. Lamarsh, A.J. Baratta, "Introduction to Nuclear Engineering," 3rd Edition, Prentice Hall, 2001		
Course Coordinator:	Frank Rytkonen		
Regular Instructors:	Frank Rytkonen		
Course Objectives:	<p>Upon completion of the lecture, a student should be able to:</p> <ul style="list-style-type: none"> • Explain the atomic and nuclear physics governing nuclear reactions. • Calculate the energy released from fission chain reaction processes. • Discuss the components of nuclear reactors and the nuclear cycle. • Calculate radiation diffusion, absorption and effects on human and environmental health. • Debate the risks and benefits of nuclear reactors in relation to human health and the environment, especially in the context of global warming. 		
Topics Covered:	<ul style="list-style-type: none"> • Atomic and nuclear physics and reactions • Neutron lifecycle and reactor kinetics • Interaction of radiation with matter • Nuclear reactors and power plant cycles • Radiation shielding and protection • Reactor safety and the environment • Ethical responsibilities in nuclear power, including industrial accident case studies 		
Relevant Program Outcomes:	<p>(a) an ability to apply knowledge of mathematics, science, and engineering (d) an ability to function on multi-disciplinary teams (e) an ability to identify, formulate, and solve engineering problems (f) an understanding of professional and ethical responsibility (g) an ability to communicate effectively (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (j) a knowledge of contemporary issues (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (l) an ability to apply the fundamentals of energy conversion and applications</p>		
Required or Elective:	Elective		
Criterion 5:	Engineering Topics		
Prepared By:	Frank Rytkonen	Updated:	5/7/10