

UNST 229: Contemporary Issues in Nuclear Energy

Catalog Description: This course is designed to present a current understanding of nuclear energy. Different reactor designs, economics of nuclear energy and management of nuclear energy will be reviewed. Nuclear power will be compared to other alternative energy sources. Emphasis will be placed upon regulations, environmental issues, health issues and security and safety concerns. Nuclear power and options for the future will be examined.

Prerequisites: none

Textbooks: Nuclear Energy Now, (NEN), A.M. Herbst & G. W. Hopley, Wiley, 2007, (low cost paperbacks) Nuclear Energy in the 21 Century NEC, I Hore-Lacy, 2006; Nuclear Renewal NR, R. Rhodes, 1993; Alternative Energy Sources AES, D. Gunkel ed., 2006; plus prepared course notes, class notes have been taken these books

References: Nuclear Energy: Principles, Practices and Prospects, D. Bodansky, 2004; Nuclear Energy, R. Murray, 2001

Course Objectives for the Student: The student will be able to discuss nuclear power generation at a high level. The students will understand the economics of nuclear power and why nuclear power is different from all other forms of power generation. They will appreciate why nuclear power generation has been highly successful in Japan and France. Students will also be able to discuss the various risks of nuclear energy in comparison to viable alternatives. They will also appreciate why some forms of alternative energy are not as viable as initially assumed. The student will also be familiar with antinuclear positions, effects of public opinion, environmental and health issues, accident experiences and analysis, security and safety concerns, and options for the future

Topics: This course is to take an unbiased approach to the discussion of the nuclear energy. Topics include the uranium atom; the generation of nuclear energy; the history of nuclear energy in the US; different reactor and plant designs; economics of nuclear energy versus oil, gas, coal, wind, solar; alternative energy sources, e.g., oil, coal, tar sands, oil shale, wind, solar, tidal; antinuclear position, public opinion; management of nuclear energy; the US, Japanese and French experiences; regulation ratcheting; environmental issues; health issues; radiation exposure; security and safety concerns; accident experience and analysis; severe accidents; options for the future: new reactors, spent fuel problem, storage and disposal options, reprocessing options.

UNST Goals Covered: The student will learn:

- effective written and oral communication of ideas by writing an essay on nuclear power.
- broad-based critical-thinking skills by evaluation of various energy sources.
- appreciation for diverse cultures in how they use nuclear power.
- social responsibility and civic engagement by understanding the present energy situation.

A 15 week Semester Schedule

<u>Week</u>	<u>Topic</u>	<u>Reading Assignment</u>	<u>Homework Assignment</u>
1	Introduction & Uranium atom	class notes, NEN: Preface, Intro.	Senator's position
2	The USA Nuclear Story	class notes, NEN:1	US Representative's Position
3	The Japanese Nuclear Story	class notes	Locate the nuclear plants near your home
4	The French Nuclear Story	class notes	Explore home energy use
5	Management Experiences USA	class notes, NEN:2	Economics of alternatives
6	Risks, Accidents, Changes, Test		
7	Energy Situation Now	class notes, NEN:3	Differences in Energy
8	Energy Supply, Demand, Electricity	class notes	Visit a nuclear power plant
9	Nuclear Fuel Cycle	class notes	Poll public opinion at grocery store
10	Advanced Reactors, Options, Decisions	class notes, NEN:4	Use a Geiger counter
11	Health Risks & Fatalities	class notes, NEN:5	Radiation exposures in student's life
12	Environmental, Safety Issues, Test	class notes	Investigate security devices
13	Economics, Decommissioning, Transport	class notes	Visit TMI
14	Anti CO2 Position	class notes	Do a personal energy audit
15	Review and Final Conclusions	NEN:6	

Fall Classes

Week	Week	Week
1 Aug 17-21	6 Sept 22-28	11 Oct 29-Nov 4
2 Aug 24-28	7 Sept 29- Oct 5	12 Nov 5-11
3 Aug 31 - Sept 4	8 Oct 6-12	13 Nov 12-18
4 Sept 8-14	9 Oct 13-21	14 Nov 19 - 30
5 Sept 15-21	10 Oct 22-28	15 Dec 1-5

Grade Evaluation

- **Tests:** 2 exams: 100 points; final exam: 100 points; Total Test Points: 300
- **One Essay Report:** The student will write one ten page report on nuclear energy.
- **Homework:** The students will develop a notebook covering their various assignments
- **Attendance:** Attendance will be taken at the beginning and end of the lectures. Late students and students who leave early will be marked absence. Written reasonable excuses for absences/lateness will be accepted. Total Attendance Points: 200. **Grading:** Total Points 400. Need 60% (or better) average in tests minus attendance for a D in this course, 70% or better - C, 80% or better - B, 90% or better - A

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Assignments

Review Questions: These review questions occur after each section or chapter of the course. They are intended to re-enforce the material presented in each section.

Intermediate Level Assignments: These are assignments that are at a higher level than the review questions. These assignments are more general and more extensive than the review questions. These assignments include those listed above under Homework Assignments. Addition questions include:

- 1) What is your position on nuclear energy? Why do you have such a position? Answer at the beginning of course & at end
- 2) What does your family, e.g. mother, father, sister, brother, etc., think of nuclear power?
- 3) What does your minister's position?
- 4) What are your views on the various energy sources?
- 5) What is your energy usage? Car, Home, Apartment?
- 6) What is your utility bill?
- 7) What are positions of your senator and house of representative on nuclear energy?
- 8) What are the various positions taken at the state level, e.g., governor's position, state house, etc?
- 9) What are the various political organizations for & against nuclear power?
- 10) New energy sources: is the cure worse than the bite?
- 11) Read newspaper or magazine articles and critic the contents.