

## MECHANICAL ENGINEERING PROGRAM

### ABET COURSE SYLLABUS

#### ME 456: Radioactive Waste Management (3 credits)

##### Course Description (2008-2010 Catalog):

Radioactive waste sources, federal regulations, health effects, radiation protection, spent fuel management, high-level waste management, low-level waste management, transuranic waste management, mill tailings management, decommissioning and decontamination, repository programs, alternate disposal methods, and other wastes.

##### Prerequisite Course: Senior standing in engineering

##### Prerequisite by Topic:

Textbook: None

Other Reference Material: N/A

Course Coordinator: Denis Beller, Research Professor

##### Course Objectives:

- (a) Understand the nuclear fuel cycle and sources of radioactive waste.
- (b) Be able to classify radioactive wastes and determine disposal options available.
- (c) Understand and be able to evaluate the options available for the management of radioactive wastes.
- (d) Understand the fundamental concepts underlying the performance assessment of disposal options.

##### Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	1.b	1.c	1.d	1.e	2.a	2.b	2.c	2.d	3.a	3.b	3.c	3.d
H		M	H	L	M	L		M		L	L	

(L)ow (M)edium (H)igh

**Topics Covered:**

1. Nuclear Reactor – Overview of Designs
2. Nuclear Fuel Cycles
  - a. Mining
  - b. Milling
  - c. Conversion
  - d. Enrichment
  - e. Storage
  - f. Recycling
  - g. Disposal
3. Nuclear Waste Policy Act & Amendments
4. Classification of Nuclear Waste
5. Waste Management Strategies
6. Groundwater Hydrology
7. Contaminant Transport
8. Performance Modeling
9. Waste Form Engineering
10. Probabilistic Risk Assessment
11. Regulatory Requirements
  - a. High Level Waste Disposal
  - b. Low Level Waste Disposal
12. Life Cycle Cost
13. Systems Engineering: Analysis of Complex Systems

**Laboratory Projects:** None

**Assessment of Student Progress toward Course Objectives**

Mid-term Exam, Homework Assignments, Term Project, Final Exam

**Class/Laboratory Schedule:** MW 4:30-5:45 PM (Spring Semester)

**Contribution of Course for meeting Professional Component:**

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|--|-----------|
| (a) Mathematics and basic sciences:      | 0 credit  |
| (b) Engineering Topics (Design/Science): | 3 credit  |
| (c) General Education:                   | 0 credit  |
| (d) Others:                              | 0 credits |