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:

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<th>Goal 1: Provide mechanical engineering graduates with technical capabilities.</th>
<th>Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.</th>
<th>Goal 3: Instilling a sense of responsibility as a professional member of society.</th>
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(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
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

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:

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