

University of California at Berkeley  
College of Engineering  
Department of Nuclear Engineering

**NE290G**  
**Scientific and Regulatory Basis for Environmental Protection in Nuclear Fuel Cycle**

Fall 2010  
3 units

**Instructor:** Prof. Joonhong Ahn, 4157 Etcheverry Hall,  
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**Time:** TuTh, 11:00–12:30  
**Office Hour:** W 1:00-3:00.

***Catalog Description***

This course is intended for graduate students interested in acquiring a foundation in scientific and regulatory basis for environmental safety for nuclear fuel cycles, including basic computational capability. The course contents consist of (1) the standards and regulations, (2) Technical bases for assessing environmental impacts of nuclear fuel cycle facilities under normal operation and accidental situations, (3) Interpretation of environmental impact assessment results, and (4) student mini-projects.

***Course Prerequisite(s)***

- NE224 and/or NE225 are recommended.

***Course Contents***

1. Environmental impact assessment and related regulations for nuclear-fuel cycle facilities
  - (a) General approach for environmental impact assessment
  - (b) Regulations for environmental protection for nuclear fuel cycle facilities
2. Scenarios and models for radionuclide release into the environment
  - (a) In normal operations (wastes and controlled effluents)
  - (b) In accidents
3. Pathways and dispersion of radionuclides in the environment (Atmosphere, Ocean, Land)
  - (a) In normal operations (wastes and controlled effluents)
  - (b) In accidents
  - (c) Mathematical models for transport of radionuclides in the environment
  - (d) Computational tools
4. Evaluation of exposure dose rates
  - (a) Mathematical models for transport of radionuclides in the biosphere and radiation exposure
  - (b) Computational tools
5. Uncertainties and confidence building
  - (a) Mathematical theory for uncertainty analyses
  - (b) Computational tools
  - (c) Interpretation of assessment results and confidence building
6. Case studies for environmental impact assessment (Mini projects by students)  
Reprocessing facility; Interim storage; Uranium milling

***Textbooks:***

- Class notes and reading materials prepared by the instructor will be distributed through *ospace*.

***Homework:***

Total 3 - 5 sets of homework problems will be given.

***Grading:***

25%: Homework, 25%: Midterm exam, and 50%: Final project (20% presentation and 30% report).

Week	Day	
	8/26	Organization; Scope
1	8/31	(I) Standards and regulations applied for nuclear fuel cycle facilities
	9/2	■ Domestic
2	9/7	(I) Standards and regulations applied for nuclear fuel cycle facilities
	9/9	■ International
3	9/14	(II) Technical bases for assessing environmental impacts of nuclear fuel cycle facilities
	9/16	
4	9/21	■ Scenarios and models for radionuclide release into the environment ➤ Normal operations ➤ Accidents
	9/23	(II) Technical bases for assessing environmental impacts of nuclear fuel cycle facilities
5	9/28	■ Pathways and dispersion of radionuclides in the environment (Atmosphere, Ocean, Land)
	9/30	
6	10/5	(No class)
	10/7	(No class)
7	10/12	(II) Technical bases for assessing environmental impacts of nuclear fuel cycle facilities
	10/14	■ Evaluation of exposure dose rates
8	10/19	Mini-project planning -- Project proposals
	10/21	(III) Interpretation of numerical results of environmental impact assessment
9	10/26	
	10/28	■ Uncertainties and confidence building
10	11/2	
	11/4	
11	11/9	Mid-term exam
	11/11	(Holiday)
12	11/16	(IV) Mini-project planning
	11/18	Interim report
13	11/23	(No class)
	11/25	(Holiday)
14	11/30	Closing discussions; Class evaluation
	12/2	(No class)
RRR		Final presentation