COURSE #: NERS 462; **CREDITS:** 3/Elective	**COURSE TITLE:** Reactor Safety Analysis
TERMS OFFERED: Fall	**For each prerequisite below, "E" denotes Enforced and "A" denotes Advised.**
TEXTBOOKS/REQUIRED MATERIAL: Lee and McCormick, *Risk and Safety Analysis of Nuclear System* (in press)	**PRE-REQUISITES:** Preceded or accompanied by NERS 441 (E)
INSTRUCTOR(S): John Lee	**COGNIZANT FACULTY:** Lee
CATALOG DESCRIPTION: Analysis of those design and operational features of nuclear reactor systems that are relevant to safety. Reactor containment, engineered safety features, transient behavior and accident analysis for representative reactor types. NRC regulations and procedures. Typical reactor safety analyses.	**COURSE TOPICS:** 1. Overview on reactor safety and radiation exposure (9h) 2. Component failure probability and system reliability (10h) 3. Probabilistic safety assessment (12h) 4. System analysis and passive safety (6h) 5. Radionuclide source term and licensing procedures (5h)

COURSE OBJECTIVES For each Course Objec links to the Program Educational Objectives are shown	1. To teach students general concepts and issues behind nuclear reactor and power plant safety. [1,2,3] 2. To teach students concepts and tools for probabilistic risk assessment (PRA). [1,2] 3. To prepare students to make decisions regarding ethical, economic, and environmental aspects of nuclear energy.[3] 4. To expose students to career opportunities in nuclear engineering. [3]
COURSE OUTCOMES For each Course Outcome, links to The Program/ABET Student Outcomes are shown [#,a-k]	1. Demonstrate a basic understanding of the relationships between sources, exposure, and effects of radiation. [1-4,8,9,11|ABET a,k,e,c,h,f,j] 2. Obtain quantitative and probabilistic basis for system reliability and availability subject to failures and repairs. [2-4|ABET k,e,c] 3. Construct fault and event trees for representative power plant systems and describe key features of a representative computer software for PRA study of nuclear power plants[1-4,8,9,11|ABET a,k,e,c,h,f,j] 4. Identify and characterize key engineered safety features of nuclear power plants[1-4,8,9,11] |ABET a,k,e,c,h,f,j] 5. Describe causes and consequences of major accidents and incidents in nuclear power plants[1-4,8,9,11|ABET a,k,e,c,h,f,j] 6. Develop detailed understanding of a representative PRA for nuclear power plants [1-4,8,9,11|ABET a,k,e,c,h,f,j] 7. Demonstrate basic concepts of passive safety features in nuclear power plants[1-4,8,9,11|ABET a,k,e,c,h,f,j] 8. Describe basic principles for atmospheric dispersion of radionuclides and associated radionuclide source term[1-4,8,9,11|ABET a,k,e,c,h,f,j]
ASSESSMENT TOOLS For each	1. A combination of during-term and final examinations measure all outcomes for individual students under a time constraint. 2. Problem sets measure all outcomes under less time pressure and with student collaborations.

assessment tool, links to the Course Outcomes are identified	3. Discussions with students during the development of computer programs evaluate outcomes 3, 4, 5, and 8. 4. Course evaluation by each student at the end of the course assesses all outcomes. 5. Faculty self-assessment provides self-assessment data on all outcomes.

Revision History: September 1998; June 2010