COURSE #: NERS 484; **CREDITS:** 4/Required	**COURSE TITLE:** Radiological Health Engineering Fundamentals
TERMS OFFERED: Fall	**For each prerequisite below, “E” denotes Enforced and “A” denotes Advised.**
TEXTBOOKS/REQUIRED MATERIAL: Instructor cou notes, Martin, *Physicsfor Radiaiton Protection*, 2nd Ed.	**PREREQUISITES:** NERS 312 or equivalent or permission of instructor (A)
INSTRUCTOR(S): Kimberlee Kearfott	**COGNIZANT FACULTY:** Kearfott
CoE BULLETIN DESCRIPTION: Fundamental physics behind radiological health engineering and topics in quantitative radiation protection. Radiation quantities and measurement, regulations and enforcement, external and internal dose estimation, radiation biology, radioactive waste issues, radon gas, emergencies, and wide variety of radiation sources from health physics perspective.	**COURSE TOPICS:** Nuclear physics (0.5h), making assumptions (1h), radiation interactions (1 kinetics (3.5h), radiation protection philosophy and limits (1.5h), radiatior quantities (1.5h), external dose measurement, assessment, and reduction (4 internal dose assessment (8h), radiation health risks (2h), special topics in radiation protection (15h) (selected from non-ionizing radiation, public communica environmental radiation, nuclear reactor health physics, health effects of r weapons, nuclear emergencies, radiation contamination and control, venti transportation, low level waste, high level waste, radon gas, radiation regulations), project presentations (6.5h), team function discussions (1h)
COURSE STRUCTURE/SCHEDULE Lecture: 2 per week @ 80 minutes, Recitation: 1 per week @ 50 minutes	
COURSE OBJECTIVE For each Course Objective, links to the Program Educational Objectives are shown	1. Understand how fundamental nuclear physics applies to radiation protection [1,2] 2. Appreciate the appropriate application of analytical methods and computational tools, with simplifying assumptions, for radiation safety problems [1,2] 3. Become familiar with elements of applied radiation protection through the study of specialized topics in health physics [1-3] 4. Be bettered prepared to make decisions regarding ethical, economic, and environmental aspects of radiation technologies [3] 5. Be aware of the career opportunities in radiological health engineering [3] 6. Develop team skills [3] 7. Improve written and oral communication skills [3]
COURSE OUTCOMES For each Course Outcome, links to The Program/ABET Student Outcomes are shown [#,a-k]	1. Demonstrate applied competence in applying basic physics knowledge to analyze problems of radiation interactions [2, 3|ABET k,e] 2. Formulate simple first order kinetics problems relating to radiation protection problems [2, 3|ABET k,e] 3. Solve problems in external dose assessment, including simple shielding, using basic and standardized approaches [2,3|ABET k,e] 4. Solve problems in internal dose assessment [2, 3|ABET k,e] 5. Show understanding of the risks of low and high level radiation dose and limitations in knowledge of these [8,9,11|ABET h,f,j] 6. Solve problems or prepare materials relating to one or more specialized topics in radiation protection [2,3,8,9,11|ABET k,e,h,f,j] 7. Produce a significant written team report containing analysis of a radiological health engineering problem

	[2, 3, 6, 7, 8, 9, 11|ABET k,e,d,g,h,f,j] 8. Present, with a team, a live presentation relating to the written report (oral report, briefing, mock interview, mock press conference, or other communication) [6, 7, 8, 9, 11|ABET d,g,h,f,j]
ASSESSMENT TOOLS For each assessment tool, links to the Course Outcomes are identified	1. Two tests will be used to measure outcomes [1-6] for individual students. 2. Problem sets measure outcomes [1-6] under less time pressure and with student collaborators 3. Team Function Evaluations (~monthly) and three Peer Evaluations monitor team performance [7, 8] 4. Optional extra credit for attendance at guest lecturers and other seminars encourages career exploration and assists in preparation of team project [6, 7, 8] 5. Written team report [1-7] 6. Oral team presentation [1-8] 7. Course evaluation by each student at the end of the course assesses all outcomes [1-8] 8. Faculty self-assessment provides self-assessment data on all outcomes. [1-8]

Revision History: September, 1998; December, 2004; August, 2005; November, 2006; September 2010