COURSE #: NERS 315 **CREDITS:** 4/Required	**COURSE TITLE:** Nuclear Instrumentation Lab
TERMS OFFERED: Winter	**For each prerequisite below, "E" denotes Enforced and "A" denotes Advised.**
TEXTBOOKS/REQUIRED MATERIAL: Knoll, *Radiation Detection and Measurement*, 3rd Edition	**PREREQUISITES:** (A) EECS 215 or 314 and preceded or accompanied by (A) NERS 312
INSTRUCTOR(S): Zhong He	**COGNIZANT FACULTY:** Zhong He
CoE BULLETIN DESCRIPTION: An introduction To the devices and techniques most common in nuclear measurements. Topics include the principles of operation of gas-filled, semiconductor, and scintillation detectors or charged particle, gamma ray, and neutron radiations techniques of pulse shaping, counting and analysis radiation spectroscopy, signal timing and coincidence measurements.	**COURSE TOPICS:** 1. Radiation sources and interactions; 2. General detector properties; 3. Pulse shaping and processing; 4. Counting statistics and error analysis; 5. Gas-filled detectors; 6. Scintillators and light converters; 7. Semiconductor detectors; 8. Slow and fast neutron detectors

COURSE STRUCTURE/SCHEDULE Lecture: 1 per week @110 minutes; Laboratory: 1 per week @ 4 hours

COURSE OBJECTIVES For each Course Objective, links to the Program Educational Objectives are shown	1. Learn the basic science of radiation sources and their interactions with matter [1,2] 2. Learn the underlying science of radiation detection [1,2] 3. Learn how to estimate uncertainties in measurements[1,2] 4. Learn how to team-work, perform laboratory experiments, and improve communication skills[1,2,3]
COURSE OUTCOMES For each Course Outcome, links to the Program/ABET Student Outcomes are identified. [#,a-k]	1. Describe the physical mechanisms of radiation interactions in materials [1|ABET a] 2. Show knowledge the theory of electronic pulse generation and time-dependent pulse shapes [5|ABET b] 3. Describe the role of pulse shaping and processing units [5|ABET b] 4. Describe the use of the major detector types applicable for specific radiations [4|ABET c] 5. Demonstrate understanding on data acquisition and analysis [1,5|ABET a,b] 6. Demonstrate knowledge of the statistical models of random processes and statistical sources of uncertainty [1,5|ABET a,b] 7. Demonstrate team work skills by working in small laboratory teams [6|ABET d] 8. Demonstrate ability to communicate scientific results [5-7|ABET b,d,g]
ASSESSMENT TOOLS For each assessment tool, links to the Course Outcomes are identified	1. Written exams covering all outcomes for individual students under time constraint**. [1-10]** 2. Written laboratory reports (both formal and informal) [1-11] 3. Laboratory instructor written evaluation of student performance and skill level [1-11] 4. Oral laboratory exams [1-11] 5. Written homework [1-10] 6. Course evaluation by each student at the end of the course assesses all outcomes. 7. Faculty self-assessment provides self-assessment data on all outcomes.

Revision History: September, 1998, December 2004, August 2005, July 2010, October 2010