

NUC K110 Radiation, Health, Safety

☒ Required ☐ Elective

Catalog Description: Introduction to basic concepts associated with nuclear physics and nuclear radiation, health, and safety. Topics: nuclear structure, radioactivity, and interaction of radiation with matter, shielding, radiation measurement, exposure, and biological effects.

Prerequisites: MAT K186, CHE K121

Textbook(s) or other materials: Basic Radiation Protection; Gollnick, 4<sup>th</sup> edition

Course learning outcomes/Expected performance criteria:

Upon completion of the course, the student will know in detail: the various types of radioactive decay, their decay mechanisms, and resulting radiation decay modes. The student will also understand the impact of radiation on various biological systems and appreciate the principles of exposure control (time, distance and shielding). These principles are taught from both the conceptual and mathematical approach.

The student will also learn the physical principles of radiation detection as well as how the application and limitations of current detection equipment. Pertinent federal exposure/dosage regulations will be covered.

The course will also teach the student how internal radiation exposure/damage can be minimized by controlling airborne and waterborne concentrations of radionuclides.

Topics covered:

	HOURS
1. Atomic and Nuclear Structure	1
2. Radioactive Decay and Radiation	3
3. Interaction of Radiation with Matter	3
4. Radiation Detectors and Measurement	8
5. Biological Effects of Radiation	3
6. Dose and Exposure Control	4
7. Regulations	2
8. Waste Disposal	1
9. Internal Exposure and Removal of Airborne and Waterborne Activity	4
TOTAL HOURS:	30

Class/Lab schedule: Two class sessions each week

Relationship of course to Criterion 5 and Program Outcomes:

Prepared by: Brent Maynard

NUC K111 Radiation, Health Safety Lab

☒ Required ☐ Elective

Catalog Description: Designed to give the student hands-on experience working with a variety of radiation monitoring devices. Sthe students will also gain experience in the processing and analysis of counting data.

Prerequisites:

Textbook(s) or other materials: Basic Radiation Protection; Gollnick, 4th edition

Course learning outcomes/Expected performance criteria:

Upon completion of this course the student will have; a working knowledge of radiation measurement with various instruments, a familiarization with the measurement of very low levels of radiation, and a practical knowledge of the principles used in processing data from radiation measurements.

Topics covered:

COURSE TOPICS/CONTENT	HOURS
The following topics will be the object of specific laboratory exercises;	
Introduction to Laboratory Equipment and Procedures	4
Statistics	4
Chart of Nuclides	4
Shelf Correction	3
Shielding	3
Radiation Counts vs. Distance	3
Determination of a Decay Half-Life	3
Air Sampling	3
Measurement of Low Level Activity	3
TOTAL HOURS	30

Class/Lab schedule: One lab session scheduled per week

Relationship of course to Criterion 5 and Program Outcomes:

Prepared by: James R. Sherrard