Syllabus

NUC K110:	Radiation Health Safety
Instructor:	As Assigned (Part-Time Adjunct)
Office Hours:	By appointment
Required Texts:	Basic Radiation Protection Technology, Current Edition, by Daniel A. Gollnick
	Nuclides and Isotopes, Current Edition, Bechtel Marine Propulsion Corporation
Materials:	Computer Access; Scientific Calculator; Notebook

Course Description:

This course is an introduction to basic concepts associated with nuclear physics and nuclear radiation, health, and safety. Topics include nuclear structure, radioactivity, and interaction of radiation with matter, shielding, radiation measurement, exposure, and biological effects.

The material is intended to compliment other nuclear program course material such as nuclear physics, systems, instrumentation, and most directly, the Radiation Health Safety Lab.

Formal Program Outcomes (Nuclear):

The course is designed to assist in achieving Nuclear Engineering Technology associates degree program outcomes as listed in the current Three Rivers Community College catalogue.

Learning Objectives for this Course:

1. Manipulate and perform mathematical operations using scientific notation, commonly used prefixes and exponents used in the study of radiation phenomena.
2. Identify and quantify common sources of radiation encountered in everyday life, list references that aid the student in understanding the nature of radiation, and characterize radiation emitted from a known radioactive source.
3. Identify the fundamental parts of the atom, including their relative sizes, masses and interactive characteristics. Use accepted nuclear conventions and definitions when describing atoms of various elements.
4. Define the various types of radiation encountered in the nuclear energy field, mass-energy equivalency, and the penetrating ability of each in types of matter.
5. Utilize the Chart of Nuclides to identify and characterize radioactive isotopes, follow decay chains, and identify radioactive decay daughters and parents.
6. Describe the radioactive decay process, define scientific terms relative to activity and decay processes, and perform decay/half life calculations.

7. Describe specific radiation interactions with matter, including secondary effects, resulting byproducts, shielding principles, and the concept of damage to human tissue.
8. Explain the operation of radiation detection devices such as ion chambers, fission chambers, portable detection equipment, and laboratory sensors such as photomultiplier and germanium detectors.
9. Describe the biological effects of radiation on humans, define technical exposure terms, and explain limits set by the Nuclear Regulatory Commission (NRC) and other regulatory agencies.
10. Define and explain the effects of very small and very large doses of radiation on humans, including the concepts of radioactive contamination and "effective" half life.
11. Describe the formation of 'new' radioactive nuclides in a nuclear power plant environment, controlling their generation and spread as contaminants, and explain how each affect the environment in which nuclear workers occupy.
12. Describe methods of characterizing and controlling radiation, radioactive contamination, and accepted methods and practices for protecting radiation workers.
13. Explain how statistics are used to identify radioactive nuclides, and compare occupational and other risks associated with human activities.
14. Analyze a historical major nuclear accident and present the likely short-term and long-term effects of radiation and contamination on a population.
15. Work with classmates on assignments and scenarios to demonstrate teamwork, peer checking, error reduction, and the production of superior outcomes.

Classroom Activities:

In the classroom students will actively participate in discussions and assignments as collaboration is in itself an essential element of learning. The use of texts, handouts, internet and library resources are required elements to support classroom work.

Outside the Classroom:

Homework will be assigned to you both individually and occasionally as groups in the form essay assignments. Collaboration is an expectation and your methods of communication and meeting are strictly up to you. Homework is expected to be turned delivered on-time unless otherwise cleared through your instructor. Your homework grades will depend on both group and individual projects.

You have the OPTION of working solo on major projects if you prefer. But you will held to the same standard as groups the produce their work through collaborative efforts. The college has a large number of computers with appropriate software available for your use if needed. Our primary software for generating reports and presentations is Microsoft Word and PowerPoint.

Course Grading:

Your work is expected to evolve in a positive direction as the weeks pass by. You are expected to attend classes regularly and inform the instructor via email or text if you cannot attend. A grade deduction may be imposed for poor attendance and/or bad behavior. Typically, your final grade depends on several factors:

Homework and quizzes: **25%**

Assignment will be graded on a 0 to 100 scale and then averaged. A missed assignment will receive a grade of "0". Late assignments will be penalized unless previously cleared by the instructor.

Major Assignments: **25%**

Assignments classified as "major" will include an essay (first half of semester) and a group report/presentation (second half of semester).

Midterm Exam: **25%**

Final Exam: **25%**

Grading Scale
A = 90-100 (Discretionary + or -)
B = 80-89 (Discretionary + or -)
C = 70-79 (Discretionary + or -)
D = 62-69 (Discretionary + or -)
F = < 62 or incomplete

Typical Milestones

Milestone	Description
Week 2: Assignment of Personal Essay (Due week 7)	Fundamentals of radiation, nuclides or related topic: 1000 – 1200 words.
Week 8: Mid-Term Exam	Graded in-class exam covering first-half topics.
Week 9: Assignment of Group Project (Due week 13)	Report (format provided) and classroom presentation.
Week 13-14: Presentations	Short classroom presentations based on group project report.

Milestone	Description
Week 15: Final Exam	Graded in-class exam. Focused more on second half material and overall concepts.

Special Notes:

1. If you have a disability that may affect your progress in this course, please meet with a Disability Service Provider (DSP) as soon as possible. Please note that accommodations cannot be provided until you provide written authorization from a DSP.

TRCC Disabilities Service Providers Counseling & Advising Office Room A-119	
Matt Liscum (860) 383-5240	• Physical Disabilities • Sensory Disabilities • Medical Disabilities • Mental Health Disabilities
Chris Scarborough (860) 892-5751	• Learning Disabilities • ADD/ADHD • Autism Spectrum