NUET 3910 PRINCIPLES OF NUCLEAR TECHNOLOGY

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Course Description

Introduction to nuclear technology and radiation physics; includes sources of radiation, its interaction with matter, and radiation detection and measurement.

Prerequisites: PHYS 2220, MATH 1720.

Course Objectives

By the end of the course, the students will be able to:

- Understand and predict the behavior of radioactive materials
- Understand previously acquired skills and concepts from Calculus and Physics
- Understand and calculate reaction rates and the nuclear fission process
- Be able to explain the operation of nuclear detectors
- Use counting statistics to perform nuclear calculations
- Understand the interactions of radiation with people
- Understand concepts related to nuclear heat generation and removal, reactor safety
- Understand concepts pertaining to radioactive waste disposal

Program Outcomes

a. an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines,
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology,
f. ability to identify, analyze and solve technical problems,
l. technical expertise in engineering materials, statics, dynamics, strength of materials, fluid power or fluid mechanics, thermodynamics and either electrical power or electronics.

Student Learning Outcomes

Upon completion of this course, students will be able to do the following, given appropriate parameters:

1. Solve problems that involve radioactive decay of individual or groups of isotopes. (a, b, f)
2. Calculate nuclear reactions rates and reactor criticality. (a, b, f)
3. Solve problems that involve radiation detection. (a, b, f)
4. Solve problems using counting statistics and error propagation. (a, b, f)
5. Calculate expected dose rates and accumulated radiation dose. (a, b, f)
6. Calculate reactor power, turbine power, and plant efficiency. (a, b, f, l)
7. Calculate decay heat removal requirements. (a, b, f, l)
8. Perform calculations related to short and long-term storage requirements of radioactive materials. (a, b, f, l)

Required text

**Grading Criteria**

Homework Assignments / Short Quizzes  20%
Midterm Exam #1                   25%
Midterm Exam #2                 25%
Final Exam                                    30%

**Grade Distribution**

≥ 90%    = A
80 – 89.5% = B
70 – 79.5% = C
60 – 69.5% = D
< 60%     = F

**Disabilities Accommodation:**
The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940-565-4323 during the first week of class.