

NUC K100 Introduction to Nuclear Systems

Required       Elective

Catalog Description: Introduction to the major systems of a commercial nuclear power plant. Designed for the student with no prior knowledge of engineering principles; it adheres to a systematic approach to operations and explains the underlying theoretical principles. The course focuses on Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) plant design. Presents and overview of the Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactor (FBR) and High Temperature Gas-cooled Reactor (HTGR).

Prerequisites: None

Textbook(s) or other materials: Introduction to Nuclear Systems, Northeast Utilities, 4th edition; Boiling Water Reactors, Northeast Utilities, 2nd edition

Course learning outcomes/Expected performance criteria:

After completion of the course, the student would be familiar with the major systems of Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) plants and their operating principles. The student should also have a basic understanding of the desing of the Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactor (FER) and the High Temperature Gas-cooled Reactor (HTGR)

Topics covered:	HOURS
1. <u>Introduction</u> Nuclear Engineering Fundamentals	3
2. <u>Primary Systems</u> Reactor Coolant System Chemical and Volume Control System Shutdown Cooling System Engineered Safety Features Emergency Core Cooling System Radioactive Waste Systems	15
3. <u>Secondary Systems</u> Main Steam System Feed and Condensate Systems Turbine Generator Electrical Distribution System	13
4. <u>Instrumentation and Control</u> Nuclear Instrumentation Rod Control and Position Indication Reactor Protection System Feed Water Control	5
5. <u>Integrated Plant Operations</u> Nuclear Instrumentation Rod Control and Position Indication Reactor Protection System Feed water Control	2
6. <u>Other Types of Reactors</u> Boiling Water Reactor (BWR) Liquid Metal Fast Breeder Reactor (LMFBR) Pressurized Heavy Water Reactor (PHWR) High Temperature Gas-cooled Reactor (HTGR)	8

Class/Lab schedule: Two class sessions each week

Relationship of course to Criterion 5 and Program Outcomes:

All students are required to maintain an online learning portfolio in Digication that uses the college template. Through this electronic tool students will have the opportunity to monitor their own growth in college-wide learning. The student will keep his/her learning portfolio and may continue to use the Digication account after graduation. A Three Rivers General Education Assessment Team will select and review random works to improve the college experience for all. Student work reviewed for assessment purposes will not include names and all student work will remain private and anonymous for college improvement purposes. Students will have the ability to integrate learning from the classroom, college, and life in general, which will provide additional learning opportunities. If desired, students will have the option to create multiple portfolios.

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**Nuclear Engineering Technology**

**Three Rivers Community College**

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