SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION, MANUFACTURING AND TECHNOLOGY DIVISION
Energy Generation Operations Technology Program
Revision Date: August 21, 2023
Syllabus Statements

I. CATALOG DESCRIPTION

Course Number:	ENER2205
Course Title:	Nuclear Power Plant Layout
Prerequisite(s):	ENER2102
Catalog Description:	This course will introduce the student to the technology of nuclear power generation used in modern power producing nuclear plants. An overview will be provided on how electricity is produced from nuclear energy, the basic mechanical systems and components necessary to all electrical generation facilities, and the special systems associated with nuclear facilities. This course also covers the purpose, operation, flow paths and system interactions of basic reactor systems. Emergency operating procedures, automatic control systems, abnormal system conditions, alarm systems are among the many topics covered in this course.
Credit Hours:	3
Class Hours:	45
Lab Hours:	0
Total Contact Hours:	45

II. COURSE OBJECTIVES: *Course will:*

A. Introduce an in depth working knowledge of the interactions of atoms and the resulting energies produced and their applications in a controlled environment within a nuclear reactor.

B. Familiarize students with the designs, structures and functions of nuclear power plants.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. Student Learning Outcomes: *Student will be able to:*

1. Explain how the safety of a reactor is of prime concern to its owner, to ensure the safety of the public, the reactor operators, and of the investment itself.

2. Explain nuclear power plant design.

3. Discuss accident mitigation systems.

4. Identify auxiliary and support systems and their function.

5. Discuss normal nuclear power plant operations.

B. General Education Learning Outcomes (GELOs)

1. GELO #3: Critical Thinking & Problem Solving
Outcome 1: Synthesize information to arrive at reasoned solutions to problems.
Outcome 5: Acquire and integrate knowledge and construct relationships across disciplines.

IV. CONTENT/TOPICAL OUTLINE

A. Nuclear Cross Section, Fission and Classification of Neutrons

1. Neutron Induced Fission

2. Decay Heat

B. Neutron Life Cycle

1. Neutron Balance – Steady State

2. Six Factor Formula
3. Reactivity Calculation

C. Overview of the Basic Steam Cycle

D. PWR Reactor
1. System Design
2. Control Mechanisms

E. BWR Reactor
1. System Design
2. Control Mechanisms

F. Containment
1. Purpose
2. Designs
3. Control

G. Feedwater and Condensate
1. Pumps
2. Heaters

H. Condenser and Circulating Water
1. Direct Cycle
2. Cooling Towers
3. Vacuum control

I. Main Steam/Turbines
1. Main Steam
2. Extraction Steam
3. Turbines
4. Moisture Separator/Reheater

J. Reactor Support Systems
1. BWR
2. PWR

K. Conventional Support Systems
1. Service Water
2. Emergency Service Water

L. Operational Issues
1. Operator's Role
2. Hazards

V. INSTRUCTIONAL MATERIALS

A. Required Text(s): None
B. Other Resources: Internet, online activities
C. Outside Reading/Research required: Internet Research assignments
D. Supplies: 3 Ring binder with blank paper for notes and USB Flash Drive

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:
1. Face-to-face
2. Hybrid

VII. METHODS OF EVALUATION

A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
1. Class participation

2. Regular assignments
3. Written exams and/or quizzes
4. Performance and observational assessments

VIII. SPECIFIC COURSE REQUIREMENTS

A. A minimum grade of "C" or 70% is required to receive credit for this course.

B. A minimum grade of "B" or 80% is required to achieve the NUCP certificate, in accordance with ACAD 08-006, Revision 1, dated October 2016.

C. Cheating within the Manufacturing Division: Any violation of academic integrity on assignments, quizzes, or tests will result in a grade of 0 on that assignment, quiz, or test. A second violation in any course after the initial infraction will result in a grade of F for that course. Any additional violations while in the program will result in a suspension from the program.

D. Credit by Examination: Credit for the course CANNOT be earned through Credit by Examination.