

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION, MANUFACTURING AND TECHNOLOGY DIVISION
Energy Generation Operations Technology Program
Revision Date: August 26, 2019

I. CATALOG DESCRIPTION

Course Number: ENER2140
Course Title: Electric Power Transmission Fundamentals
Prerequisite(s): ENER1210 or permission by Program Chair
Catalog Description: This course will introduce the fundamentals of electrical transmission system management. Transmission and substation schematics and control systems are modeled. Inter-relationship of generation, load, voltage, and frequency are demonstrated. Identification of faults within the system, operation of isolating equipment, and recovery strategies by operators will be practiced on a simulated transmission system.
Credit Hours: 2
Class Hours: 23
Lab Hours: 23
Total Contact Hours: 46

II. COURSE OBJECTIVES: *Course will:*

- A. Demonstrate the requirements to manage an electrical transmission system.
- B. Introduce the standard terminology and layout of substations and transmission systems.
- C. Demonstrate key aspects of electrical transmission management including: frequency control, voltage support, VAR control, and isolation/connection operations.
- D. Explain load balancing and transmission capacity, including reserve requirements.
- E. Demonstrate fault issues and their impact on electrical transmission.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Understand and navigate electrical transmission and substation schematics.
 - 2. Monitor and control a simulated electrical transmission system.
 - 3. Control key electrical transmission system parameters including line capacity, voltage, and frequency.
 - 4. Identify fault conditions and take appropriate corrective action including identification, isolation and correction to maintain and/or restore system stability.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #5: Analytical, Quantitative, and Scientific Reasoning
Outcome 2: Understand and create logical arguments supported by quantitative and scientific evidence and communicate those arguments in a variety of formats.

IV. CONTENT/TOPICAL OUTLINE (course outline may provide more detailed information)

- A. Understanding transmission and substation schematics.
- B. Generation and load balancing.
- C. Transmission capacity.
- D. Frequency and voltage control.
- E. Fault identification and isolation.
- F. System recovery.

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): Clough, Robert, *Electric Power System Fundamentals*, 2nd Edition, ISBN: 978-1-939815-06-4; other materials will be provided by instructor
- B. Other Resources: Internet connection, classroom activities

VI. METHODS OF PRESENTATION

- A. Methods of presentation will include traditional face to face and/or online, to be determined by instructor:
 - 1. Hybrid

VII. METHODS OF EVALUATION

- A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Homework and Quizzes, accounting for 40% of final grade.
 - 2. Exercises demonstrating competency and problem solving on transmission control system simulator, accounting for 60% of final grade.

VIII. SPECIFIC COURSE REQUIREMENTS

- A. A minimum grade of C or 70% is required to receive credit for this course.
- B. 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 U for that course. Any additional violations while in the program will result in a suspension from the program.
- C. Credit by Examination: Credit for the course CANNOT be earned through Credit by Examination.