

**Fond du Lac Tribal and Community College
COURSE OUTLINE FORM**

Updated 9/23/14

Please return this form to the college vice president of academic affairs and the chairperson of the Academic Affairs and Standards Council (AASC)

1. Prepared by: _____

2. Date submitted: _____

3. Date approved: _____ Date revised 09/23/14

4. Department/discipline: Electric Utility Technicians

5. Department(s) endorsement(s): _____

(Signatures of the person(s) providing the endorsement are required.)

6. Course Title: Protective Relaying

Abbreviated course title (25 characters or less): _____

7. Course Designator: EUT 8. Course Level: 1050 9. 2XXX

10. Number of Credits: Lecture 2 Lab 1

11. Control Number (on site) 20 Control Number (online) _____

12. Catalog/Course description:

In this course, students will be introduced to the technologies of protective relaying, Electric Utilities use protective relays to monitor and disconnect electric transmission and distribution lines for fault conditions. Relay components, relay types, and relay maintenance techniques will be taught by an experienced electric utility relay professional. Students will learn through hands-on use of electronic equipment. Fault simulation equipment will be employed, and students will become acquainted with the activities encountered by relay technicians. (Prerequisite: EUT 1020 Basic Electricity, EUT 1021 AC Electricity for Electric Utility Technicians or concurrent registration in EUT 1040 Power Electronics & Communications Equipment)

13. Course prerequisite(s) or co-requisite(s): Accuplacer scores/ Other courses

Prerequisite(s): EUT 1020 Basic Electricity, EUT 1021 AC Electricity for Electric Utility Technician, or concurrent registration in EUT 1040 Power Electronics & Communications Equipment

Co-requisite:

14. **Course Materials** (Recommended course materials and resources. List all that apply, e.g. textbooks, workbooks, study guides, lab manuals, videos, guest lecturers).

Texts 1: Protective Relaying Theory and Applications ISBN # 0824791525

Other texts to be selected yearly based upon content and availability, and will be listed on the syllabus.

Lab equipment will be provided.

15. Course Content (Provide an outline of major topics covered in course)

1. Career Overview of Relay Technicians
 - a. Employment forecasts
 - b. Job requirements
 - c. Educational requirements
2. Electrical Characteristics of Transmission and Distribution Lines
 - a. Active and reactive power
 - b. Frequency control
 - c. Voltage control
 - d. Voltage stability
 - e. Angle stability
 - f. Power oscillations
 - g. Power system restoration
3. Three Phase "Y", Three Phase Delta, and Two Phase Circuits
4. Power Transformers
5. Power Circuit Breakers and Circuit Interruption
6. General Introduction to Protective Relays
7. Troubleshooting and Maintenance
8. Fault Simulation and Diagnostics Practice

16. Learning Goals, Outcomes, and Assessment

At FDLTCC we have 4 Competencies Across the Curriculum (CAC) areas. They are as follows:

- A. Information Literacy (the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information)
- B. Ability to Communicate (the ability to listen, read, comprehend, and/or deliver information in a variety of formats.)
- C. Problem Solving (the ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.)
- D. Culture (knowledge of Anishinaabe traditions and culture, knowledge of one's own traditions and culture, knowledge of others' traditions and cultures, culture of work, culture of academic disciplines and/or respect for global diversity.)

Upon the completion of this course the student will be able to:

1. Demonstrate knowledge of three phase control relays. (B, C)
2. Properly connect electronic control relay (A, B)
3. Connect to and program a Switzer relay. (B, C)
4. Demonstrate ability to understand relay sequence. (A, B, C)

17. Minnesota Transfer Curriculum (MnTC): If this course fulfills an MnTC goal area, state the goal area and list the goals and outcomes below:

See www.mntransfer.org

Goal Area(s): _____

Goal and Outcomes: