

Clackamas Community College

Online Course/Outline Submission System

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Section #1 General Course Information

Department: [Apprenticeship](#)

Submitter

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Course Prefix and Number: APR - 232UE

Credits: 4

Contact hours

Lecture (# of hours): 44

Lec/lab (# of hours):

Lab (# of hours):

Total course hours: 44

For each credit, the student will be expected to spend, on average, 3 hours per week in combination of in-class and out-of-class activity.

Course Title: [Line Estimator Responsibility II: Substation](#)

Course Description:

Principles and concepts that govern field responsibilities related to substation line maintenance. Focus is on voltage regulation, circuit protection, high voltage fuses, air break switches, transformers, and related safety issues and procedures.

Type of Course: Career Technical Apprenticeship

Can this course be repeated for credit in a degree?

No

Does this course map to any general education outcome(s)?

No

Is this course part of an AAS or related certificate of completion?

Yes

Name of degree(s) and/or certificate(s): Electrician Apprenticeship Technology AAS

Are there prerequisites to this course?

No

Are there corequisites to this course?

No

Are there any requirements or recommendations for students taken this course?

Yes

Recommendations: None

Requirements: Accepted into the Line Estimator apprenticeship program

Are there similar courses existing in other programs or disciplines at CCC?

No

Will this class use library resources?

Yes

Have you talked with a librarian regarding that impact?

No

Is there any other potential impact on another department?

No

Does this course belong on the Related Instruction list?

No

GRADING METHOD:

A-F Only

Audit: No

When do you plan to offer this course?

✓ Not every term

Is this course equivalent to another?

If yes, they must have the same description and outcomes.

No

Will this course appear in the college catalog?

No

Will this course appear in the schedule?

No

Student Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. discuss types of connections used with various voltages and the types of high-voltage fuses that are used on distribution systems,
2. outline the sequence of events that takes place in a fuse when a fault occurs, differentiate between reclosures and sectionalizers, and list devices that provide circuit protection for a substation;
3. list the advantages of using oil circuit breakers for opening and closing circuits and describe the impurities that cause oil deterioration and the process for removing moisture and impurities,
4. describe the main types of air switches and how they are operated and review safety issues and procedures that should be followed when installing and operating air break switches,
5. explain the purpose of a watt hour meter,
6. review basic concepts of voltage regulation, including control of voltages on utility electrical systems and step voltage regulator functions on a distribution system;
7. identify and describe the components and functions of a transformer and discuss the use of transformer taps,
8. discuss the function of an insulator tester,
9. summarize the discharge cycle of a battery,
10. compare and contrast the different types of thermocouples,
11. outline safety procedures for working on an energized capacitor bank,
12. describe transformer use on specific primary systems.

This course does not include assessable General Education outcomes.

Major Topic Outline:

1. Types of high voltage fuses that are used on distribution systems.
2. Order of events that take place in a fuse when a fault occurs.
3. Difference between reclosures and sectionalizers.
4. Device functions that provide circuit protection to a substation and its distribution circuits.
5. Advantage of using oil circuit breakers for opening and closing circuits.
6. Impurities that cause oil to deteriorate.
7. Process to remove moisture or impurities.
8. Types of air switches and how they are operated.
9. Safety issues that should be followed when installing and operating air break switches.
10. Purpose of a watt hour meter.

11. Voltage regulation.
12. Control of voltages on utility electrical systems.
13. Step voltage regulator functions on a distribution system.
14. Components of a transformer.
15. Function of a transformer.
16. Use of transformer taps.
17. Function of an insulator tester.
18. Discharge cycle of a battery.
19. Different types of thermocouples.
20. Safety procedures for working on an energized capacitor bank.
21. Transformer use on specific primary systems.
22. Type of connection used with various voltages.

Does the content of this class relate to job skills in any of the following areas:

- | | |
|--------------------------------------|-----------|
| 1. Increased energy efficiency | No |
| 2. Produce renewable energy | No |
| 3. Prevent environmental degradation | No |
| 4. Clean up natural environment | No |
| 5. Supports green services | No |

Percent of course: 0%

First term to be offered:

Next available term after approval

:
