



Note to Instructor: Replace the placeholder text beneath the headings with the appropriate information for your course. Please note that all sections, with the exception of "Other Course Information," are required elements.

Basic Course Information

Semester:	Spring 2021	Instructor Name:	JAVIER AVENDANO
Course Title & #:	APRL 107	Email:	jhavendano@iid.com
CRN #:	21718	Webpage (optional):	Imperial.edu
Classroom:	IID RL	Office #:	NA
Class Dates:	02/16 – 06/11, 2021	Office Hours:	06:00 – 16:30
Class Days:	Tuesday	Office Phone #:	760-482-9816
Class Times:	16:00 – 20:15	Emergency Contact:	Miriam Larson
Units:	4	Class Format:	F

Course Description

A review of fundamentals and testing techniques for the following types of relays: directional overcurrent, distance and line differential. Continue study in principles and application of flow in substations.

Course Prerequisite(s) and/or Corequisite(s)

Successful completion of APRL 106 with a "C" or better.

Student Learning Outcomes

Upon course completion, the successful student will have acquired new skills, knowledge, and or attitudes as demonstrated by being able to:

1. Test (manually and automatically) directional overcurrent EM & microprocessor relays
2. Test (manually and automatically) distance relays (EM & microprocessor)
3. Test (manually and automatically) line differential relays
4. Perform phasing in transmission & distribution buses
5. Troubleshoot different equipment used in substation, transmission and distribution systems

Course Objectives

The student will be able to:

1. Practice standard safety procedures appropriate to the power utility industry.
2. Install and maintain relays in substations.
3. Provide relay maintenance to power lines connected to or installed in substations.



Textbooks & Other Resources or Links

Blackburn, J. and Domin, Thomas Protective Relaying Third edition CRC Press
Werstiuk, Chris, The Relay Testing Handbook, Principles and Practices

Course Requirements and Instructional Methods

REQUIRED WRITING:

Written homework assignments consisting of nine to ten pages in length, which involve problem-solving analysis in electrical formulas, diagrams/schematics and another substation information.

OUTSIDE ASSIGNMENTS

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short-term classes.

Outside class assignments will include reading assigned textbooks, handouts, completion of exercises, periodic research, and critiquing and analyzing problems.

INSTRUCTIONAL METHODOLOGY:

Check all that apply:

- ☒ lecture
- ☒ laboratory
- ☒ lecture-laboratory combination
- ☐ directed study

Course Grading Based on Course Objectives

90-100% = A
80-89% = B
70-79% = C
60-69% = D
Below 60% = F

There are 5 Lab Reports (50 pts. each)
1 mid-term (50 pts.)
1 final exam. (100 pts.)

Total of 400 pts. Total accumulated points are divided by 400 to arrive at percentage score.

Academic Honesty

Academic honesty in the advancement of knowledge requires that all students and instructors respect the integrity of one another's work and recognize the important of acknowledging and safeguarding intellectual property.

There are many different forms of academic dishonesty. The following kinds of honesty violations and their definitions are not meant to be exhaustive. Rather, they are intended to serve as examples of unacceptable academic conduct.

- Plagiarism is taking and presenting as one's own the writings or ideas of others, without citing the source. You should understand the concept of plagiarism and keep it in mind when taking exams and preparing written materials. If you do not understand how to "cite a source" correctly, you must ask for help.
- Cheating is defined as fraud, deceit, or dishonesty in an academic assignment, or using or attempting to use materials, or assisting others in using materials that are prohibited or inappropriate in the context of the academic assignment in question.

Anyone caught cheating or plagiarizing will receive a zero (0) on the exam or assignment, and the instructor may report the incident to the Campus Disciplinary Officer, who may place related documentation in a file. Repeated acts of cheating may result in an F in the course and/or disciplinary action. Please refer to the IID policy and procedures 4530 for more information on academic dishonesty or other misconduct. Acts of cheating include, but are not limited to, the following: (a) plagiarism; (b) copying or attempting to copy from others during an examination or on an assignment; (c) communicating test information with another person during an examination; (d) allowing others to do an assignment or portion of an assignment; (e) using a commercial term paper service.

Attendance

- A student who fails to attend the first meeting of a class or does not complete the first mandatory activity of an online class will be dropped by the instructor as of the first official meeting of that class. Should readmission be desired, the student's status will be the same as that of any other student who desires to add a class. It is the student's responsibility to drop or officially withdraw from the class. See [General Catalog](#) for details.
- Regular attendance in all classes is expected of all students. A student whose continuous, unexcused absences exceed the number of hours the class is scheduled to meet per week may be dropped. For online courses, students who fail to complete required activities for two consecutive weeks may be considered to have excessive absences and may be dropped.
- Absences attributed to the representation of the college at officially approved events (conferences, contests, and field trips) will be counted as 'excused' absences.

Classroom Etiquette

- Electronic Devices: Cell phones and electronic devices must be turned off and put away during class, unless otherwise directed by the instructor.
- Food and Drink are prohibited in all classrooms. Water bottles with lids/caps are the only exception. Additional restrictions will apply in labs. Please comply as directed by the instructor.
- Disruptive Students: Students who disrupt or interfere with a class may be sent out of the room and told to meet with the Campus Disciplinary Officer before returning to continue with coursework. Disciplinary procedures will be followed as outlined in the [General Catalog](#).
- Children in the classroom: Due to college rules and state laws, only students enrolled in the class may attend; children are not allowed.

Online Etiquette

- What is netiquette? Netiquette is internet manners, online etiquette, and digital etiquette all rolled into one word. Basically, netiquette is a set of rules for behaving properly online.
- Students are to comply with the following rules of netiquette: (1) identify yourself, (2) include a subject line, (3) avoid sarcasm, (4) respect others' opinions and privacy, (5) acknowledge and return messages promptly, (6) copy with caution, (7) do not spam or junk mail, (8) be concise, (9) use appropriate language, (10) use appropriate emoticons (emotional icons) to help convey meaning, and (11) use appropriate intensifiers to help convey meaning [do not use ALL CAPS or multiple exclamation marks (!!!!)].
-

Student Rights and Responsibilities

Students have the right to experience a positive learning environment and to due process of law. For more information regarding student rights and responsibilities, please refer to the IVC [General Catalog](#).

IVC Student Resources

IVC wants you to be successful in all aspects of your education. For help, resources, services, and an explanation of policies, visitor click the heart icon in Canvas.

Anticipated Class Schedule/Calendar

I. RULES AND REGULATIONS

Week 1: "Switching Orders," (Lecture & Demonstration)

Week 2: "Flash outs/Electrical Burns," (Safety Dept. /Nurse)

CD: [Safety in Meter Work](#)

CD: [Introduction to Metering](#)

II. SERVICE CONNECTIONS AND TROUBLESHOOTING

Week 3: Test Equipment for Relay Protection – Introduction to Doble and Pulsar relay protection test equipment- Single Phase Testing

Week 4: Relay Protection – Testing Relays – Basic Relays (lab)

Week 5: Relay Protection – Testing Relays – Basic Relays (lab)

Week 6: Safety in T & D Maintenance

CD: [Safety in T&D Maintenance](#)

-
- Week 7: "Control Equipment" – DC Schematics
- Week 8: "Using Specialized Electrical Test Equipment," – Meggers, phase angle meters, timers for relay protection – Introductory to testing procedures
- Week 9: "Using Specialized Electrical Test Equipment" - **continued**
- Week 10: "System Protection & Monitoring"
- CD: *System Protection & Monitoring***
- Week 11: "System Protection & Monitoring," Demonstration & Lab
- Week 12: "System Protection & Monitoring," Lab & Independent Study
- Week 13: "Switching Orders," (Lecture & Demonstration)

III. REVIEW OF ADVANCED ELECTRICAL SYSTEMS

- Week 14: "Branch Circuits & Feeders," (Chapter 2 – *Electrical Systems*)
- Week 15: Trade Test 2
- "Calculations," (Chapter 3 – *Electrical Systems*)
- Trade Test 3
- Week 16: "Services," (Chapter 4 – *Electrical Systems*)
- Trade Test 4
- "Conductors & Over-current Protection," (Chapter 5 - *Electrical Systems*)
- "Grounding," (Chapter 6 – *Electrical Systems*)
- Final Exam

*****Subject to change without prior notice*****