

### Basic Course Information

Semester:	<b>Fall 2018</b>	Instructor Name:	<b>Javier Avendano</b>
Course Title & #:	<b>APRL 107</b>	Email:	<b>jhavendano@iid.com</b>
CRN #:	<b>11444</b>	Webpage (optional):	
Classroom:	<b>BB-LAB</b>	Office #:	<b>IID-BB</b>
Class Dates:	<b>August 13 - Dec 7, 2018</b>	Office Hours:	<b>6:00 am - 4:30 pm</b>
Class Days:	<b>Friday</b>	Office Phone #:	<b>760-482-9878</b>
Class Times:	9:00 - 13:30	Emergency Contact:	<b>Miriam Larson</b>
Units:	4.0		

### Course Description

A review of fundamentals and testing techniques for the following types of relays: transformer/bus differential, overcurrent directional and sync check. Introduction to line differential relays. Continue study in principles and application of flow in substations.

### 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) transformer differential relays
2. Test (manually and automatically) bus differential relays
3. Test (manually and automatically) sync check relays
4. Test (manually and automatically) overcurrent directional relays
5. Perform phasing in transmission & distribution buses
4. 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 transformers connected to or installed in substations.

### Textbooks & Other Resources or Links

Blackburn, J. and Domin, Thomas Protective Relaying Third edition CRC Press

Kurtz, Edwin D., and Thomas M. Shoemaker. The Lineman and Cableman’s Handbook. 8<sup>th</sup> edition. New York: McGraw-Hill, 1992.

Callahan, Michael and Bill Wusinich, Electrical Systems Based on the 2004 NEC.

### Course Requirements and Instructional Methods

#### REQUIRED WRITING:

Written homework assignments consisting of nine to ten pages in length, which involve problem-solving analyzation 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

Augmented with a performance review to determine if all course objectives have been met –

Class Participation	20%	A = 100-90
Homework	20%	B = 89-80
Laboratory	20%	C = 79-70
Quizzes	20%	F = Below 70
Pre-test/Final exam	<u>20%</u>	
	100%	

#### IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?

Yes  No  Number of times course may be taken for credit: 2

If yes, identify specific provision of Title 5 Division 2 section(s), 55761-55763 and 58161 which qualifies course as repeatable: 58161 Part C 2A

**CONTACT PERSON:** Director, Vocational Programs, 760-355-6419

### 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 absence 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.

### **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 [General Catalog](#) 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.

### **Additional Student Services**

Imperial Valley College offers various services in support of student success. The following are some of the services available for students. Please speak to your instructor about additional services which may be available.

- **CANVAS LMS.** Canvas is Imperial Valley College's main Learning Management System. To log onto Canvas, use this link: [Canvas Student Login](#). The [Canvas Student Guides Site](#) provides a variety of support available to students 24 hours per day. Additionally, a 24/7 Canvas Support Hotline is available for students to use: 877-893-9853.
- **Learning Services.** There are several learning labs on campus to assist students through the use of computers and tutors. Please consult your [Campus Map](#) for the [Math Lab](#); [Reading, Writing & Language Labs](#); and the [Study Skills Center](#).
- **Library Services.** There is more to our library than just books. You have access to tutors in the [Study Skills Center](#), study rooms for small groups, and online access to a wealth of resources.

### **Disabled Student Programs and Services (DSPS)**

Any student with a documented disability who may need educational accommodations should notify the instructor or the [Disabled Student Programs and Services](#) (DSP&S) office as soon as possible. The DSP&S office is located in Building 2100, telephone 760-355-6313. Please contact them if you feel you need to be evaluated for educational accommodations.

### **Student Counseling and Health Services**

Students have counseling and health services available, provided by the pre-paid Student Health Fee.

- **Student Health Center.** A Student Health Nurse is available on campus. In addition, Pioneers Memorial Healthcare District provide basic health services for students, such as first aid and care for minor illnesses. Contact the IVC [Student Health Center](#) at 760-355-6128 in Room 1536 for more information.
- **Mental Health Counseling Services.** Short-term individual, couples, family and group counseling services are available for currently enrolled students. Services are provided in a confidential, supportive, and culturally sensitive environment. Please contact the IVC Mental Health Counseling Services at 760-355-6310 or in the building 1536 for appointments or more information.

### **Veteran's Center**

The mission of the [IVC Military and Veteran Success Center](#) is to provide a holistic approach to serving military/veteran students on three key areas: 1) Academics, 2) Health and Wellness, and 3) Camaraderie; to serve as a central hub that connects military/veteran students, as well as their families, to campus and community resources. Their goal is to ensure a seamless transition from military to civilian life. The Center is located in Building 600 (Office 624), telephone 760-355-6141.

### **Student Equity Program**

- The Student Equity Program strives to improve Imperial Valley College's success outcomes, particularly for students who have been historically underrepresented and underserved. The college identifies strategies to monitor and address equity issues, making efforts to mitigate any disproportionate impact on student success and achievement. Our institutional data provides insight surrounding student populations who historically, are not fully represented. Student Equity addresses disparities and/or disproportionate impact in student success across disaggregated student equity groups including gender, ethnicity, disability status, financial need, Veterans, foster youth, homelessness, and formerly incarcerated students. The Student Equity Program provides direct supportive services to empower students experiencing insecurities related to food, housing, transportation, textbooks, and shower access. We recognize that students who struggle meeting their basic needs are also at an academic and economic disadvantage, creating barriers to academic success and wellness. We strive to remove barriers that affect IVC students' access to education, degree and certificate completion, successful completion of developmental math and English courses, and the ability to transfer to a university. Contact: 760.355.5736 or 760.355.5733 Building 100.
- The Student Equity Program also houses IVC's Homeless Liaison, who provides direct services, campus, and community referrals to students experiencing homelessness as defined by the McKinney-Vento Act. Contact: 760.355.5736 Building 100.

### **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](#).

### **Information Literacy**

Imperial Valley College is dedicated to helping students skillfully discover, evaluate, and use information from all sources. The IVC [Library Department](#) provides numerous Information Literacy Tutorials to assist students in this endeavor.

## 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,” **(MB# 14 – Video WKBK)**

***Safety in T&D Maintenance***

**CD:**

Week 7: “Control Equipment,” **(Video – SSM# 4 & WKBK)** – 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,” **(MB# 16 – Video WKBK)**

**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: “The National Electric/Telecomm Code,” (Chapter 1- *Electrical Systems*), Trade Test 1

Week 15: “Branch Circuits & Feeders,” (Chapter 2 – *Electrical Systems*)

Week 16: Trade Test 2

“Calculations,” (Chapter 3 – *Electrical Systems*)

Trade Test 3

Week 17: “Services,” (Chapter 4 – *Electrical Systems*)

Trade Test 4

“Conductors & Over-current Protection,” (Chapter 5 - *Electrical Systems*)

“Grounding,” (Chapter 6 – *Electrical Systems*)

Final Exam