University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Electrical and Computer Engineering
Bachellor of Science in Electrical Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INEL 5415
Course Title: Power System Protection
Number of credits: 3
Contact Period: 45

2. Course Description:

English: Design and selection of protective devices used in generation, transmission, and distribution for electrical systems: relays, fuses, breakers, reclosers, arresters. Protection coordination. Selection of other system components such as sectionalizers and throw-overs. Insulation coordination..

Spanish: Diseño y selección de dispositivos de protección usados en sistemas de generación, transmisión y distribución de energía eléctrica: relevadores, fusibles, interruptores, restauradores y pararrayos. Coordinación de protección, selección de otros componentes del sistema tales como: seccionalizadores y conmutadores de dos direcciones. Coordinación de aislación.

3. Pre/Co-requisites and other requirements:

INEL 4415

4. Course Objectives:

This is a course for majors in electric power engineering. After completing the course, the student should be able to specify and set up relays for the protection of a power system.

5. Instructional Strategies:

☒conference ☒discussion ☐computation ☐laboratory

☐seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☐practice ☐trip ☐thesis ☒special problems ☐tutoring

☐research ☐other, please specify:

6. Minimum or Required Resources Available:

All students are expected to bring a solid background in electric power systems fundamentals. Students must always bring to class the textbook and a scientific calculator (preferably one that handles complex numbers).

7. Course time frame and thematic outline

Outline	Contact Hours
Protective Relaying Introduction & Philosophy	3
CT Performance	3
Operating Principles of Electro-Magnetic Relays	3

Current Diferential Relaying,Transformer Protection, Bus Protection	7
Electromagnetic Induction Relays	3
Directional Relays, Application of Overcurrent Relays,Case Studies	9
Distance Relays, Application Case Study	5
Step Distance Protection, Pilot Relaying, Case Study	9
Generator Protection Survey	3
Total hours: (equivalent to contact period)	45

8. Grading System

☒ Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	**Percent**
☐ **Exams**		
☐ **Final Exam**		
☒ **Short Quizzes**	**__7__**	**80%**
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**1**	**20%**
☐ **Journals**		
☐ **Other, specify: Homework**	**_____**	
TOTAL:		**100%**

10. Bibliography:

Elmore, W., (2004) Protective Relaying: Theory & Application (2nd Ed), Monticello, NY, Marcel Dekker, Inc.

Blackburn, J. L. (1998) Protective Relaying: Principles & Applications (2nd Ed), Monticello, NY, Marcel Dekker, Inc.

Mason, C. R. The Art & Science of Protective Relaying, GE Publication, available at http://www.geindustrial.com/pm/notes/artsci/

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

12. Course Outcomes — **Map to Program Outcomes**

1. Possess sufficient knowledge of power system analysis and — (a)

operation, including short circuits to specify the set up and coordination of protective relaying .

2. Understand faulted electric power system to succesfully to identify applicable protection schemes. (a)
3. Be able to apply complex variable concepts to the solution of relaying coordination problems. (a)
4. Be able to follow logical and orderly design procedures to choose the best solution for the relaying of the power system. (c)
5. Be able to determine criteria to to compare the designed outcome. (c)
6. Be aware of modern protection schemes using combination of microprocessor based relays. (k)
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