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 4415
Course Title: Power System Analysis
Number of credits: 3
Contact Period: 45
Elective course in INEL

2. Course Description:

English: Formulation of bus admittance and bus impedance matrices, symmetrical components, symmetrical and unsymmetrical faults, power flow, economic operation of power system.

Spanish: Formulación de las matrices de admitancia e impedancia, componentes simétricos y fallas asimétricas, flujo de potencia, operación económica de sistemas de potencia.

3. Pre/Co-requisites and other requirements:

INEL 4103

4. Course Objectives:

This is a course for majors in electric power engineering. After successfully completing this course students will be able to formulate and solve the power flow problem, will understand the fundamentals of economic operation of a power system, and will be able to analyze a faulted electric power systems. The course includes fundamentals of power systems operation and design.

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: Students are required to use existing power flow programs and to program, using MATLAB, their own power flow, short circuit and economic dispatch programs. These programs will be used to solve homework problems.

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**
Review of phasors, per unit and transmission lines	3
Admittance Matrix Formulation and Network Calculations	3
Power Flow Analysis	9
Economic Operation of Power Systems	12
Impedance Matrix Formulation and Network Calculations	3
Symmetrical Components	3
Symmetrical and unsymmetrical faults	9
Exams	3
Total hours: (equivalent to contact period)	45

8. Grading System

☒Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies(Suggested): The faculty member teaching the course will provide the student with the evaluation strategy he/she will be using throughout the semester. This will be done within the first week of classes.

	Quantity	Percent
☒ **Exams**	**3**	**69**
☒ **Final Exam**	**1**	**25**
☐ **Short Quizzes**	**____**	
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**3**	**6**
☐ **Journals**		
☐ **Other, specify: Homework**	**____**	
TOTAL:		**100%**

10. Bibliography:

Textbook:
Glover, J.D. Sarma, M. Power System Analysis and Design, 4th Edition (2007) McGraw-Hill, Inc.
References:
Glover, J.D. and Sarma, M Power System Analysis and Design. Third Edition. Pacific Grove, California: Brooks/Cole. 2002
Saadat, H. Power System Analysis. Boston, Maryland: WCB McGraw-Hill.
Wood, A.J. and Wollenber, B.F. Power Generation, Operation, and Control. Second Edition. New York, New York: John Wiley and Sons Inc. 1996
Anderson, P.M. Analysis of Faulted Power Systems. Reprint. New York, New York 1995

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. Contribution of Course to meeting the requirements of Criterion 5:

Math	Basic Science	General	Engineering Topic
			√

13. Course Outcomes	**Map to Program Outcomes**
- Possess sufficient knowledge of power system analysis fundamentals to enable understanding of the economic operation of electric power systems.	(a)
- Formulate and solve basic economic dispatch problems using calculus, programming and software packages.	(k)
- Learn and apply numerical analysis concepts to formulate and solve the electric power flow problem.	(a)
- Solve the electric power flow problem using commercially available software.	(k)
- Understand the physical constraints associated to a faulted electric power system to successfully model these conditions.	(a)
- Be capable to analyze a variety of faulted power system conditions using MATLAB.	(k)

Person(s) who prepared this description and date of preparation:
Submitted by: Efrain O'Neill nov 2006