

University of Puerto Rico
 Mayagüez Campus
 College of Engineering
 Department of Electrical and Computer Engineering
 Graduate Program in Electrical Engineering

Course Syllabus

1. General Information:	
Alpha-numeric codification: INEL 6027 Course Title: Dynamics and Control of Integrated Power System Number of credits: 3 Contact Period: 3 hours of lecture per week	
2. Course Description:	
English: Discussion of a variety of transient and control problems associated with interconnected power systems, and techniques for their analysis and solution. Methods for dynamic analysis of large systems are stressed.	
Spanish: Discusión de problemas transitorios y de control asociados a sistemas de potencia eléctrica interconectados y de técnicas para su análisis y solución. Se enfatizan métodos para el análisis dinámico de sistemas grandes.	
3. Pre/Co-requisites and other requirements:	
4. Course Objectives:	
Develop mathematical models of power system components and apply them in varying degrees of detail to analyze the dynamic behavior of interconnected power systems in response to small and large disturbances. Students will learn to analyze the dynamic behavior of interconnected power system when subject to large and small perturbations.	
5. Instructional Strategies:	
<input checked="" type="checkbox"/> conference <input checked="" type="checkbox"/> discussion <input checked="" type="checkbox"/> computation <input type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring <input type="checkbox"/> research <input type="checkbox"/> other, please specify:	
6. Minimum or Required Resources Available:	
Students are required to use EPRI's PSAPAC software, available in the electrical engineering computing centers, to solve homework problems and projects.	
7. Course time frame and thematic outline	
Outline	Contact Hours
Basic concepts; definition of stability System dynamic performance and criteria for system dynamic performance Types of stability studies	3
The Classical Model	3
The swing equation	3

Synchronizing power and natural frequencies of oscillations	
The Equal Area Criterion	3
Multimachine dynamics and stability studies Digital simulation of multimachine systems	1
Synchronous Machine Physics and two-axis model Parameters	6
Synchronous Machine and Network Interaction Power Transfer Interface	5
Modeling of Controls and Loads Loads Excitation Systems Turbine-Governor	8
Small Signal Stability <ul style="list-style-type: none"> • Linearization of system equations • Eigenvalues analysis, sensitivity techniques • Modes, participation factors 	8
Current Developments	4
One exam	1
Total hours: (equivalent to contact period)	

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	1	20
<input type="checkbox"/> Final Exam		
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	3	50
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Homework	varies	30
TOTAL:		100%

10. Bibliography:

This the most modern available reference.

1. K. R. Padiyar. Power System Dynamics: Stability & Control, Anshan; 2nd Ed, 2004.

Another modern reference.

2. M. Ilic and J. Zborsky. Dynamics and Control of Large Electric Power Systems, Wiley, 2000.

These are the BEST modern references.

3. P. M. Anderson and A. A. Fouad, Power System Control and Stability , 2nd Ed. IEEE Press, 2002.

4. P. W. Sauer and M. A. Pai, Power System Dynamics and Stability, Prentice Hall, 1997.

5. J. Machowski, J.W. Bialek and J.R. Bumby, Power System Dynamics and Stability, Wiley, 1997.

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.

Person who prepared this description and date of preparation:

Agustín Irizarry, August 2007