

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 6047 Course Title: ADVANCED CONTROL SYSTEM THEORY Number of credits: 3 credit Contact Period: 3 hours of lecture	
2. Course Description:	
English: Advanced Problems In Linear and Nonlinear Control Systems. The use of Linear Algebra for The Analysis and Design of Linear Systems Is Emphasized. The Implementation of Linear Systems Via Analog and Digital Simulation Diagrams Is Also Studied.	
Spanish: Problemas Avanzados en Sistemas de Control Lineales y No-lineales. Se Enfatiza el Uso de Algebra Lineal Para el Analisis y Diseno de Sistemas de Control Lineales. Se Estudia, Ademas, la Implantacion de Sistemas Lineales Mediante Diagramas de Simulacion Analógicos y Digitales.	
3. Pre/Co-requisites and other requirements:	
4. Course Objectives:	
Introduce students to advanced methodologies in control systems design.	
5. Instructional Strategies:	
<input checked="" type="checkbox"/> conference <input 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:	
Access to MATLAB Software and standard lecture facilities.	
7. Course time frame and thematic outline	
Outline	Contact Hours
Introduction to multivariable control systems.	2
State variable representation of dynamic systems.	4
Solution of the state equation: time and frequency domain methods. Modes of dynamic systems.	6
Internal and Lyapunov stability. Poles of multivariable systems.	6
Controllability and Observability.	6
Realizability and minimal realization.	3
Multivariable transmission zeros. Multivariable pole-zero	3

cancellations.	
Introduction to feedback systems. Full-state and output feedback. Eigenstructure assignment.	12
Tests	3
Total hours: (equivalent to contact period)	

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2	40
<input checked="" type="checkbox"/> Final Exam	1	30
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	1	20
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: homework	3-5	10
TOTAL:		100%

10. Bibliography:

1. P.J. Antsaklis, and A.N. Michel, Linear Systems, Birkhauser, 2006.
 2. P.J. Antsaklis, and A.N. Michel, A Linear Systems Primer, Birkhauser, 2007.
 3. Robert L. Williams, II, Douglas A. Lawrence, Linear State-Space Control Systems, John Wiley, 2007.
 4. Chen, C.T. Linear System Theory and Design, Oxford University Press, New York, 1999.
 5. J.S. Bay, Fundamental of Linear State Space Systems, McGraw Hill, 1999.
 6. T. Kailath, Linear Systems, Prentice-Hall, 1980.
 7. W.L. Brogan, Modern Control Theory, Prentice-Hall, Second and Third Edition, 1991.
- W.J. Rugh, Linear System Theory, Prentice-Hall, 1993.

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:

Miguel Vélez-Reyes, August 2007