

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 6001 Course Title: FEEDBACK CONTROL SYSTEMS I Number of credits: 3 Contact Period: 3 hours of lecture per week	
2. Course Description:	
English: The Z-transform and its application to sampled-data control systems; analysis of automatic control systems, using state variable concepts; stability criteria; introduction to parameter optimization techniques.	
Spanish: Regimen transitorio y regimen constante de sistemas lineales de control con retorno. Análisis en los dominios de tiempo y frecuencia. Diagramas de flujo de señales y teoría de la estabilidad. Solucion de Problemas Lineales Mediante el Uso de Variables de Estado	
3. Pre/Co-requisites and other requirements:	
4. Course Objectives:	
After completion of the course the student should be able to analyze design and control linear systems using state variable methods and optimal control techniques.	
5. Instructional Strategies:	
<input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input checked="" 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:	
Standard lecturing facilities, Control Systems Laboratory in S-214 for demonstrations and projects.	
7. Course time frame and thematic outline	
Outline	Contact Hours
1. Introduction to state-variable representation of systems	3
2. Static Optimization	3
3. Optimal Control of Discrete-Time Systems	8
4. Linear Quadratic Regulator for Discrete-Time Systems	8
5. Discretization of Continuous-Time Systems	1
6. Steady-State Sub-Optimal Control	3
7. Calculus of Variations	2
8. Linear Quadratic Regulator for Continuous-Time Systems	8
9. The Tracking Problem	3

10. Final-Time-Free and Constrained Input Control	3
11. Output Feedback and Structured Control	3
Total hours: (equivalent to contact period)	45

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	25
<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 Sets	4	15
TOTAL:		100%

10. Bibliography:

1. F.L. Lewis and V.L. Syrmos, Optimal Control, 2nd Ed., Wiley-Interscience, 1995. (Clasical textbook)
2. B.D.O. Anderson and J.B. Moore, Optimal Control: Linear Quadratic Methods, Dover Publications, 2007.
3. M. Athans and P.L. Falb, Optimal Control: An Introduction to the Theory and its Applications, Dover Publications, 2006.
4. C.T. Chen, Linear System Theory and Design, 3rd Ed., Oxford University Press, New York, 1999.
5. R.L. Williams, II, Douglas A. Lawrence, Linear State-Space Control Systems, John Wiley, 2007.

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:

Gerson Beauchamp, August 2007