

ECE 436 Syllabus

Course:	ECE 436
Credit Hours:	3
Course Title:	Digital Control Systems
Course Description:	

Discrete systems dynamics, sampled-data systems, mathematical representations of analog/digital and digital/analog conversions, open- and closed-loop systems, input-output relationships, state-space and stability analyses, time- and frequency-domain analyses. Design of digital controllers. Use of computer-aided analysis and design tools. Class project.

Prerequisite(s): ECE 435

Textbook(s) and/or other required material:

Digital Control Engineering Analysis and Design by M. Sami Fadali and Antonio Visioli, Academic Press, 2009

Course objectives. By the end of this course, the student should be able to (use demonstrative verbs):

By the end of this course, the student should be able to analyze and design digital control systems, test and evaluate the designs in simulation, and identify and understand the trade-offs between different solutions for the same system.

Topics covered:

Total of 40 lectures (in parentheses): Discrete-time systems and the z-transform(6); Sampling and reconstruction(6); Open-loop and closed-loop discrete-time systems(5); System time-response characteristics(2); Stability analysis techniques(7); Digital controller design(6); Pole-assignment design and state estimation(5); Digital filter structures and microprocessor implementation of digital filters(3).

Class/laboratory schedule (sessions per week and duration of each session):

Three 50-minute lectures per week.

Contribution of course to meeting the requirements of Criterion 5 - other:

Contribution of course to meeting the requirements of Criterion 5 - math and basic sciences:

Contribution of course to meeting the requirements of Criterion 5 - engineering topics:

This course contributes 3 hours of engineering science.

Contribution of course to meeting the requirements of Criterion 5 - general education:

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome A	Major	<p>Application of differential and difference equations, as well as linear algebra, to the understanding and design of control systems. The transfer of theory to practice by understanding the implications and limitations introduced when designs are implemented on microprocessors. Major course emphasis includes the techniques and skills of systems control using modern engineering tools of digital design, with the assistance of CAD tools and consideration of implementation via microprocessors.</p>
Outcome B	N/A	<p>The fundamental objective of the course is to design control algorithms to confine system behavior to designated specifications. The engineering problem is to control a system within desired performance specifications. A major course objective is to identify desired control specifications, use a variety of techniques to design a controller which will cause the system to conform to</p>
Outcome C	Major	

Relationship of this course to program learning outcomes:

Learning Outcome	Level of Instruction	Related Course Content
Outcome D	N/A	design specifications, and finally ensure that the design meets these specifications.
Outcome E	Basic	Implemented designs must be tested and their performance analyzed to meet specifications.
Outcome F	N/A	
Outcome G	N/A	
Outcome H	N/A	
Outcome I	N/A	
Outcome J	N/A	
Outcome K	N/A	

Person who last prepared this description and date of preparation:

- Brickley, James J (jjb) - Mar 20th, 2010 (06:51pm)