ECE 3551: Introduction to Feedback Control Systems

Course Description
Provides fundamental concepts in feedback control systems design and analysis.

Prior Course Number: 551
Transcript Abbreviation: Intro Feedback
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Junior, Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 3050 (352).
Exclusions: Not open to students with credit for 551.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

Provide introductory, fundamental concepts in feedback control systems, design and analysis techniques
Apply knowledge gained in mathematics, physical sciences and engineering courses to derive mathematical models of typical engineering systems to be controlled
Be exposed to applying control systems concepts in preparation for work in multi-disciplinary teams, and learn how to identify, formulate and solve control problems

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Modeling of mechanical and electro-mechanical systems. Block diagrams	4.0							
Principles of feedback	3.0							
Open loop response and time domain specifications	3.0							
Stability and Routh criterion	3.0							
Root locus construction	4.0							
Lead/lag compensator design using root locus	3.0							
Bode plots and stability (gain and phase) margins. Nyquist criterion	3.0							
Stability of systems with time delays	2.0							
Lead/lag and PID compensator design using Bode plots	4.0							
Robust control. Internal model control	4.0							
Digital and sampled-data control systems	4.0							

Grades

Aspect	Percent
Homework	20%
Midterm 1	15%
Midterm 2	15%
Final Exam	30%
Design Project	20%

Representative Textbooks and Other Course Materials

Title	Author
Modern Control Systems	Richard C. Dorf & Robert H. Bishop

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.

Course Contribution		College Outcome
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
*	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
*	3	an ability to communicate effectively with a range of audiences
	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
*	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
*	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
*	3	an ability to communicate effectively with a range of audiences
	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
*	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additional Notes or Comments

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Updated prereqs, exclusions, goals and topics to match university format 3/20/12

updated course goals after internal ABET review 5/8/14 BLA
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