ME 461 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME 461	**COURSE TITLE:** Automatic Control
REQUIRED COURSE OR ELECTIVE COURSE: Elective	**TERMS OFFERED:** Fall
TEXTBOOK / REQUIRED MATERIAL:	**PRE / CO-REQUISITES:** MECHENG 360. I (3 credits)
COGNIZANT FACULTY: R. Vasuvedan	**COURSE TOPICS:** 1. System modeling, time-domain and frequency-domain techniques 2. Control specifications (overshoot, rise time, settling time, steady-state error) 3. Stability 4. PID controllers 5. Root locus method for control design 6. Frequency response 7. Lead and lag compensation 8. State-space method for control design 9. Digital control 10. Computer methods for analysis and simulation of dynamic systems
BULLETIN DESCRIPTION: Feedback control design and analysis for linear dynamic systems with emphasis on mechanical engineering applications; transient and frequency response; stability; system performance; control modes; state space techniques; digital control systems.	
COURSE STRUCTURE/SCHEDULE: Lecture: 2 days per week at 1.5 hour	

COURSE OBJECTIVES: **for each course objective, links to the Program Outcomes are identified in brackets.**	1. Model mechanical systems [1] 2. Express control specifications [1, 2] 3. Determine system performance [1, 6] 4. Design compensators to meet control specifications [1, 2] 5. Understand digital implementation of control systems [1, 2, 6] 6. Use software tools to model, analyze, and simulate control system performance [1, 2, 6]
COURSE OUTCOMES: **for each course outcome, links to the Course Objectives are identified in brackets.**	1. Find differential equation and transfer function of single-input, single-output mechanical system [1] 2. Draw feedback system block diagram and find closed-loop transfer function [1] 3. Translate time-domain specifications into frequency-domain requirements [2] 4. Determine steady-state error to step and ramp inputs and disturbances [2, 3] 5. Given a system transfer function, find time-domain behavior (impulse, step and frequency response) [3] 6. Design PI, PD, PID, lead, and lag compensators to meet control goals [4] 7. Use software tools to design state-space controllers to meet control goals [4] 8. Use software tools to translate continuous-time controllers into digital equivalent [5] 9. Find closed-loop transfer function, system poles, frequency response using software tools [6] 10. Simulate system behavior using software tools [6]
ASSESSMENT TOOLS: **for each assessment tool, links to the course outcomes are identified**	1. Regular homework problems 2. Exam(s) and/or project(s)

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