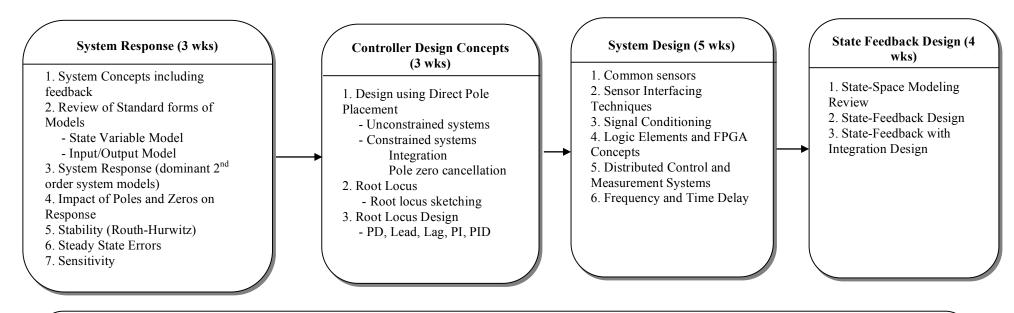
ME 375

SYSTEMS, MEASUREMENTS and CONTROL II



- 1. Reinforce system-level concepts introduced in semester I. [1, 2]
- 2. Provide necessary mathematical tools for analyzing and predicting the performance of an engineered system based on its dynamic response. [1, 2]
- 3. Provide an introductory treatment of designing feedback controllers to achieve closed-loop stability and specified system performance. [1, 2, 5, 7]
- 4. Provide hands-on experiences with take-home projects and in-lab experiments. [1, 2, 7]
- 5. Sharpen technical communication skills. [3, 5, 7]



Complementary Hands-on Home Projects and Laboratory Experiments	
Project 1: System response modeling	Laboratory 1: System response with additional poles and zeros
Project 2: Pole placement design	Laboratory 2: Servo-table position control
Project 3: Sensor interfacing	Laboratory 3: Project hardware construction
Project 4: Signal conditioning	Laboratory 4: Mass flow control
Project 5: Logic circuit design	Laboratory 5: FPGA programming
Comprehensive design project	Comprehensive design project

COURSE NUMBER: ME 375	COURSE TITLE: System, Measurements and Control II
REQUIRED COURSE OR ELECTIVE COURSE: Required	TERMS OFFERED: Fall, Spring and Summer
REQUIRED COURSE OR ELECTIVE COURSE: Required TEXTBOOK/REQUIRED MATERIAL: Provided notes and online videos COORDINATING FACULTY: G.B. King COURSE DESCRIPTION: This course continues modeling of electrical, mechanical, fluid, and thermal systems first introduced in ME 365 (Systems, Measurements and Control I), with emphasis on sensors and actuators used in feedback control systems. Systems studied in this course require active controller design to achieve performance requirements. Closed-loop system analysis and design will include both classical and modern approaches. Topics associated with digital implementation of controllers will also be discussed. Hands-on projects and laboratories are utilized to reinforce fundamental measurement and control system concepts. ASSESSMENTS TOOLS: 1. Weekly homework assignments and hands-on home projects. 2. Laboratory assignments. 3. Online quizzes for each lecture. 4. Two 1-hour midterm exams. 5. One comprehensive final exam. NATURE OF DESIGN CONTENT: Many of the homework and home assignments ask students to use analysis tools to assess the impact of different design parameters on overall performance. In lab, the availability of several methods of achieving experimental goals, troubleshooting faulty equipment and the fact that any method employed will be in error due to assumptions and approximations when modeling system behavior, means that there is not a single <i>correct</i> answer to the problem and not a single <i>correct</i> way of solving it. PROFESSIONAL COMPONENT: 1. Engineering Topics: Engineering Science – 2.5 credits (83.3%) Engineering Design – 0.5 credit (16.7%) <td> TERMS OFFERED: Fall, Spring and Summer PRE-REQUISITIES: ME 365 Systems, Measurements and Control I MA 303 Differential Eqns and Partial Differential Eqns for Engineering and the Sciences COURSE OUTCOMES [Related ME Program Outcomes in brackets]: Reinforce system-level concepts introduced in semester I. [1, 2] Provide necessary mathematical tools for analyzing and predicting the performance of an engineered system based on its dynamic response. [1, 2] Provide an introductory treatment of designing feedback controllers to achieve closed-loop stability and specified system performance. [1, 2, 5, 7] Provide hands-on experiences with take-home projects and in-lab experiments. [1, 2, 7] Sharpen technical communication skills. [3, 5, 7] RELATED ME PROGRAM OUTCOMES: Engineering fundamentals Engineering design Communication skills Ethical/Prof. responsibilities Teamwork skills Experimental skills Knowledge acquisition </td>	 TERMS OFFERED: Fall, Spring and Summer PRE-REQUISITIES: ME 365 Systems, Measurements and Control I MA 303 Differential Eqns and Partial Differential Eqns for Engineering and the Sciences COURSE OUTCOMES [Related ME Program Outcomes in brackets]: Reinforce system-level concepts introduced in semester I. [1, 2] Provide necessary mathematical tools for analyzing and predicting the performance of an engineered system based on its dynamic response. [1, 2] Provide an introductory treatment of designing feedback controllers to achieve closed-loop stability and specified system performance. [1, 2, 5, 7] Provide hands-on experiences with take-home projects and in-lab experiments. [1, 2, 7] Sharpen technical communication skills. [3, 5, 7] RELATED ME PROGRAM OUTCOMES: Engineering fundamentals Engineering design Communication skills Ethical/Prof. responsibilities Teamwork skills Experimental skills Knowledge acquisition
NI myRIO) for some of the homework assignments (home projects). LabVIEW programming is used in both Laboratory and Home Projects. Students use "ready-made" analysis modules in MATLAB and LabVIEW, in addition to writing their own special purpose programs (virtual instruments in LabVIEW) to simulate, acquire and analyze data. Programming assistance is provided in the Laboratory and online.	
COURSE STRUCTURE/SCHEDULE: Lecture – 2 times per week & 3 times per week on alternate weeks, 50 min. each. Laboratory – on alternate weeks at 150 minutes.	
PREPARED BY: G. B. King	REVISION DATE: February 06, 2019