ME 455-101 Automatic Controls

Instructor: Dr. Zhiming Ji	Office: MEC 318	Phone/Email: 973-596-3341/ji@njit.edu
Class Room: KUPF 108	Class Time: R 6:00-8:50pm	Office Hours: T5:30-6:30pm, R5:30-5:50pm

Course Description: Introduction to the principles of automatic controls. Emphasis on system analysis techniques such as Stability, Root-locus methods, Nyquist and Bode diagrams and applications in system design. **Prerequisites:** ME 305.

Course Objectives: Students are expected to:
1. Model dynamic systems through block diagrams and signal flow graphs.
2. Understand state variable models of feedback control systems.
3. Analyze characteristics of dynamics systems, measures of performances, and assess system stability.
4. Design control system using root locus, Bode Diagram, Nyquist plot and Nichols Chart.
5. Use MATLAB Control Toolbox.

Required Text: Modern Control Systems (13th Ed.), by Richard C. Dorf and Robert H. Bishop, Pearson, 2016, ISBN-13: 978-0134407623 ISBN-10: 0134407628.
Required Software: MATLAB with Control Toolbox

Grading Policy: Grades will be determined by performance on assignments and exams. The homework assignments will be worth 30% of total points. The midterm will be worth 35% of total points. The final exam will be worth 35% of total points.
Make-Up Exams: If you have a reason for missing an exam, you must contact the office of the Dean of Students. A make-up exam will be arranged after receiving a notice from the Dean of Students office.
Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic integrity policy at: https://www5.njit.edu/doss/policies/index.php.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

COURSE OUTLINE:

Week (date)	Topic	Reading Assignment
1 (9/7)	Intro/Review: Automation and Control, Modeling	Chap. 1
2 (9/14)	Transfer Functions & MATLAB	Chap. 2
3 (9/21)	Block Diagrams, Signal Flow Graph	Chap. 2
4 (9/28)	State Variable Models	Chap. 3
5 (10/5)	Control System Characteristics	Chap. 4
6 (10/12)	Measures of Performance	Chap. 5
7 (10/19)	Stability	Chap. 6
8 (10/26)	Root Locus Method	Chap. 7
9 (11/2)	Midterm	
10 (11/9)	Frequency Response: Bode Diagrams	Chap. 8
11 (11/16)	Frequency Response: Bode Diagrams	Chap. 8
12 (11/21*)	Stability: Nyquist Criterion, Relative Stability	Chap. 9
13 (11/30)	Open-loop and Closed-loop: Nichols Chart	Chap. 9
14 (12/7)	Review	
15 (12/21)	Final Exam	

* Tuesday, following Thursday schedule