ME 455-101, Automatic Controls

Instructor: Dr. Zhiming Ji	Office: MEC 203	Phone/Email: 973-596-3341/ji@njit.edu
Class Room: FMH 110	Class Time: W 6:00-8:50 pm	Office Hours: W 4:00-5:30 pm & appointment

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: Course grades will be determined by use of a curve on the total points received in all assignments and exams. The homework assignments will be worth 30%. The midterm will be worth 35%. The final exam will be worth 35%.

Absences for Religious Observations: Students must notify me in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence.

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 code of Academic Integrity policy that is found at https://t.e2ma.net/click/zzkslnb/zj44novf/bpod05x .

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Office of the Dean of Students. 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 Office of the Dean of Students at dos@njit.edu .

AI Usage: This course expects students to work without artificial intelligence (AI) assistance to better develop their skills in this content area. As such, generative AI usage is not permitted throughout this course under any circumstance.

COURSE OUTLINE

Week (date)	Topic	Reading Assignment
1 (9/3)	Intro/Review: Automation and Control, Modeling	Chap. 1
2 (9/10)	Transfer Functions & MATLAB	Chap. 2
3 (9/17)	Block Diagrams, Signal Flow Graph	Chap. 2
4 (9/24)	State Variable Models	Chap. 3
5 (10/1)	Control System Characteristics	Chap. 4
6 (10/8)	Measures of Performance	Chap. 5
7 (10/15)	Stability	Chap. 6
8 (10/22)	Root Locus Method	Chap. 7
9 (10/29)	Midterm (note: temporary date)	
10 (11/5)	Frequency Response: Bode Diagrams	Chap. 8
11 (11/13)	Frequency Response: Bode Diagrams	Chap. 8
12 (11/19)	Stability: Nyquist Criterion, Relative Stability	Chap. 9
13 (12/3)	Open-loop and Closed-loop: Nichols Chart	Chap. 9
14 (12/10)	Review	
15 (12/17)	Final Exam	

Note: November 26, Wednesday, following Friday schedule