

Spring 2024

ME 305-002: Intro to System Dynamics

Ian Fischer

Follow this and additional works at: <https://digitalcommons.njit.edu/mie-syllabi>

Recommended Citation

Fischer, Ian, "ME 305-002: Intro to System Dynamics" (2024). *Mechanical and Industrial Engineering Syllabi*. 510.

<https://digitalcommons.njit.edu/mie-syllabi/510>

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Mechanical and Industrial Engineering Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact digitalcommons@njit.edu.

COURSE NUMBER	ME 305		
COURSE TITLE	Introduction to System Dynamics		
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)		
COURSE COORDINATOR	Z. Ji		
COURSE DESCRIPTION	Principles of dynamic system modeling and response with emphasis on mechanical, electrical, and fluid systems. Application of computer simulation techniques.		
PREREQUISITE(S)	Mech 236 – Dynamics ME 231 – Kinematics Math 222 – Differential Equations		
COREQUISITE(S)	None		
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required		
REQUIRED MATERIALS	1. Katsuhiko Ogata, System Dynamics, 4th Ed., Pearson Prentice-Hall, 2004, ISBN: 0-13-142462-9 2. Software: MATLAB		
Supplemental materials (not Required)	None		
COMPUTER USAGE	MATLAB software		
COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:	Course Learning Outcomes	SOs*	Expected Performance Criteria
	1 develop models of mechanical, electrical/electromechanical and fluid systems.	1	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	2. analyze dynamic systems through the application of the Laplace transforms, block diagrams, and transfer functions.	1	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	3. determine transient and steady state response of dynamic systems.	1	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	4. calculate frequency response and use the results for vibration isolation	1, 2	Exam Question (80% of the students will earn a

			grade of 70% or better on this question)				
	5. perform basic calculation related to automatic controllers and system response specification.	1, 2	Exam Question (80% of the students will earn a grade of 70% or better on this question)				
	6. use computer software (MATLAB) in analyzing dynamics systems and control systems	1	Homework Problems (80% of the students will earn a grade of 80% or better on these problems)				
CLASS TOPICS	1. Complex Algebra, Linear Algebra, Laplace Transforms, Inverse Laplace Transforms. 2. Linear Differential Equations. 3. Modeling of Mechanical Systems. 4. Block Diagrams, Transfer Functions. 5. Electrical Systems, Electromechanical Systems. 6. Transient Response Analysis. 7. Impulse Response. 8. Analysis in Frequency Domain, Frequency Response, Vibration Isolation. 9. Feedback Control Systems and Automatic Controllers. 10. System Response Analysis and Specification.						
STUDENT OUTCOMES (SCALE: 1-3)	1	2	3	4	5	6	7
	3	2					
	3 – Strongly supported		2 – Supported		1 – Minimally supported		

* Student Outcomes