COURSE NUMBER: ME 3281, 4 credits	**COURSE TITLE:** System Dynamics and Control
TERMS OFFERED: Fall and Spring	**PREREQUISITES:** Math 2373 AEM 2021
TEXTBOOKS/REQUIRED MATERIAL: "Modeling and Analysis of Dynamic Systems, 3nd Ed", by Close and Frederick, Wiley.	**PREPARED BY:** Professor Durfee **DATE OF PREPARATION:** September 20, 2005 Updated May 23, 2007 by Prof. Dumitrica
COURSE LEADER(S): Professors Durfee, Li, Stelson,	**CLASS/LABORATORY SCHEDULE:** Three 50 minute lectures and one 120 minute recitation per week **CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES:** 100 % Engineering Topics
CATALOG DESCRIPTION: Dynamics of mechanical, electrical, thermal, fluid, and hybrid systems. System response using Laplace transform and Matlab/Simulink. Transfer functions and frequency response. Introduction to classical control.	**COURSE TOPICS:** 1. Dynamics of mechanical, electrical, thermal, fluid, and hybrid systems 2. Input-output and state-variable formulation of system equations 3. Response of first and second order systems 4. Transfer functions and frequency response 5. Basic principles of open and closed-loop feedback control systems 6. Analysis and design of classical control systems

COURSE OBJECTIVES	1. Introduce fundamental principles of dynamic systems 2. Introduce the analysis and design of SISO control systems 3. Introduce computational tools for the analysis of dynamic systems and the design and analysis of controllers

COURSE OUTCOMES	**(Letters shown in brackets are linked to program outcomes a-k)** 1. Students learn to create system equations for linear and rotary mechanical, electrical, hydraulic and thermal systems [a] 2. Students should demonstrate mastery of first and second order system equations by, for example, forming transfer functions, relating the system's response to pole location, identifying time constants and natural frequencies, and producing the response to various inputs [a] 3. Students are able to handle nonlinear systems through simulation or through linearizing [a] 4. Students are able to compute, plot and understand the frequency response of a system [a] 5. Students can use Matlab and Simulink to simulate the response of linear and nonlinear dynamic systems [k] 6. Students can design simple P, PD, and PID controllers to stabilize and/or improve the performance of an open-loop system [c, k]
ASSESSMENT TOOLS:	1. Homework assignment 2. Quizzes 3. Final Exam

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Nature of Changes
Course outcome #2 was changed from: "Students can solve first and second order system equations and produce the response to step and impulse inputs "To the more comprehensive:" Students should demonstrate mastery of first and second order system equations by, for example, forming transfer functions, relating the system's response to pole location, identifying time constants and natural frequencies, and producing the response to various inputs" no other changes we made.