

**School of Mechanical Engineering and Computer Science**  
**Mech 348: Dynamic Systems and Control**

<b>Catalog Data:</b>	<b>Mech 348 Dynamic Systems;</b> 3 credits Modeling and analysis of dynamic systems, including mechanical, electrical, fluid, and thermal systems. Fundamentals of vibration analysis, control systems.	
<b>Class Schedule:</b>	Three 50-minute lecture sessions per week, for one semester.	
<b>Laboratory Schedule:</b>	None	
<b>Prerequisites by Course:</b>	Certified Mech major, Mech 212, Mech 313	
<b>Prerequisites by Topic:</b>	Dynamics, Differential Equations, and Linear Algebra	
<b>Required Texts:</b>	Palm III. (2000) Modeling, Analysis and Control of Dynamic System. (2 <sup>nd</sup> Edition) Wiley	
<b>Course Coordinator:</b>	Dr. Linda (Xiaolin) Chen	
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>To provide students with a review of dynamics</li> <li>To instruct students in the use of modeling mechanical, electrical, thermal and fluid engineering systems</li> <li>To introduce students to the analysis of linear dynamical systems, vibrations, and control systems</li> </ol>	
<b>Topics Covered:</b>	<ol style="list-style-type: none"> <li>Dynamics review (Newtonian mechanics, translation, rotation)</li> <li>Modeling engineering systems (mechanical, electrical, thermal and fluid)</li> <li>Laplace transforms and block diagrams</li> <li>Analysis of linear dynamic systems</li> <li>Introduction to vibrations (vibrations, rotating unbalance, vibration isolation)</li> <li>Introduction to control systems (feedback control systems, PI control)</li> <li>Dynamic system simulation using MATLAB and Simulink</li> </ol>	
<b>Lab Experiments and Activities:</b>		
<b>Course Outcomes:</b>	Students will be able to:	
	<b>Assessed for Program Outcomes</b>	<ol style="list-style-type: none"> <li>A-1. Solve linear ODE models for both free and forced responses using Laplace transform.</li> <li>A-2. Describe the structure and operation of common feedback control systems using block diagrams and transfer functions.</li> <li>A-3. Apply standard predictors and measures to estimate or specify the dynamic performance of a system.</li> <li>E-2. Develop differential equations models for mechanical, electrical, fluid and thermal systems.</li> <li>E-3. Analyze simple rotating unbalance and vibration isolation systems.</li> </ol>

	<b>Other</b>	K-4. Use MATLAB and Simulink to simulate dynamic systems response.	
<b>Required or Elective Course:</b>	Required		
<b>Contribution to Professional Component:</b>	Engineering Topics		
<b>Relationship of Course to Program:</b>	Meets: Educational Objectives <u>1, 2</u> Program Outcomes <u>A, E, K</u>		
<b>Prepared by:</b>	Dr. Linda (Xiaolin) Chen	Date:	October 10, 2008
<b>Approved by CAC:</b>			