

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

<b>Catalog Data:</b>		<b>Mech 348 Dynamic Systems and Control</b> ; 3 credits Prerequisites: MECH 212, MECH 251, MATH 315, certified major in Mechanical Engineering. Modeling and analysis of dynamic systems, including mechanical, electrical, fluid, and thermal systems. Fundamentals of vibration analysis, control systems. Typically offered in spring.
<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 251; MATH 315
<b>Prerequisites by Topic:</b>		Dynamics, Differential Equations, and Linear Algebra
<b>Required Texts:</b>		Ogata, K., <i>System Dynamics</i> , 4 <sup>th</sup> Edition, 2004, Prentice-Hall Publishing
<b>Course Coordinator:</b>		Dr. Haimd Rad
<b>Course Objectives:</b>		<ol style="list-style-type: none"> <li>1. To provide students with a review of dynamics.</li> <li>2. To instruct students in the use of modeling mechanical, electrical, thermal and fluid engineering systems.</li> <li>3. 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>1. Dynamics review (Newtonian mechanics, translation, rotation)</li> <li>2. Modeling engineering systems (mechanical, electrical, thermal and fluid)</li> <li>3. Laplace transforms and block diagrams</li> <li>4. Analysis of linear dynamic systems</li> <li>5. Introduction to vibrations, rotating unbalance, vibration isolation</li> <li>6. Introduction to control systems (feedback control systems)</li> <li>7. 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 Student Outcomes</b>	<ol style="list-style-type: none"> <li>1-a. Demonstrate basic knowledge of dynamic, hydraulic, and electrical systems.</li> <li>1-c. Use appropriate models to formulate solutions using Newton's second law and law of conservation of energy.</li> <li>5-b. Share responsibilities and information on project schedule and tasks with other members as a team working on a term project.</li> </ol>
	<b>Other</b>	
<b>Required or Elective Course:</b>		Required

<b><i>Relationship of Course to Program:</i></b>	Meets: Educational Objectives <u>1, 2, 3</u> Student Outcomes <u>1, 5</u>		
<b><i>Prepared by:</i></b>	Dr. Hamid Rad	<b>Date:</b>	March 15, 2018 (4/23/18 mb)
<b><i>Approved by USC:</i></b>	4/16/18		