WASHINGTON STATE UNIVERSITY
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School of Mechanical Engineering and Computer Science

Mech 348: Dynamic Systems and Control

Catalog Data:	**Mech 348 Dynamic Systems**; 3 credits Modeling and analysis of dynamic systems, including mechanical, electrical, fluid, and thermal systems. Fundamentals of vibration analysis, control systems.
Class Schedule:	Three 50-minute lecture sessions per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	Certified Mech major, Mech 212, Mech 313
Prerequisites by Topic:	Dynamics, Differential Equations, and Linear Algebra
Required Texts:	Palm III. (2000) Modeling, Analysis and Control of Dynamic System. (2nd Edition) Wiley
Course Coordinator:	Dr. Linda (Xiaolin) Chen
Course Objectives:	1. To provide students with a review of dynamics 2. To instruct students in the use of modeling mechanical, electrical, thermal and fluid engineering systems 3. To introduce students to the analysis of linear dynamical systems, vibrations, and control systems
Topics Covered:	1. Dynamics review (Newtonian mechanics, translation, rotation) 2. Modeling engineering systems (mechanical, electrical, thermal and fluid) 3. Laplace transforms and block diagrams 4. Analysis of linear dynamic systems 5. Introduction to vibrations (vibrations, rotating unbalance, vibration isolation) 6. Introduction to control systems (feedback control systems, PI control) 7. Dynamic system simulation using MATLAB and Simulink
Lab Experiments and Activities:	
Course Outcomes:	Students will be able to: A-1. Solve linear ODE models for both free and forced responses using Laplace transform. A-2. Develop differential equations models for mechanical, electrical, fluid and thermal systems. A-3. Describe the structure and operation of common feedback control systems using block diagrams and transfer functions. A-4. Apply standard predictors and measures to estimate or specify the dynamic performance of a system. A-7. Compute the gain values required to meet stated performance specifications for controlling first-order systems. E-2. Select an appropriate control algorithm of the PID type. E-3. Analyze simple rotating unbalance and vibration isolation systems.

	K-4. Use MATLAB and Simulink to simulate dynamic systems response.		
Required or Elective Course:	Required		
Contribution to Professional Component:	Engineering Topics		
Relationship of Course to Program:	Meets: Educational Objectives 1, 2 Program Outcomes A, E, K		
Prepared by:	Dr. Linda (Xiaolin) Chen	Date:	November 1, 2006
Approved by CAC:			