

**1. MEEG 311            VIBRATION AND CONTROL**

**2. Credits 3            Contact Hours 3**

**3. Fall 2016            Herbert G. Tanner, Ph.D.; Office 228 Spencer Lab**

**4. Textbook            Vibration and Control, Special edition for the University of Delaware, by Pearson (excerpts from Franklin, Powel & Abbas' Feedback Control of Dynamic Systems 7th ed., and S.S. Rao's Mechanical Vibrations 6th ed), 2011. ISBN: 1-323-46241-4**

**5. Specific course information**

- a. Catalog Description:** Modeling and simulation of single and multi-degree-of-freedom systems, nonlinear models, linearization, transient and steady state response. Controller designs: root locus, bode plots, PID, digital implementation.
- b. Prerequisite:** MEEG211 or CIEG311
- c. Course is required.**

**6. Specific goals for the course**

- a. Specific Outcomes of Instruction:** This course will introduce you to the fundamental concepts of systems, signals, and feedback, give you some intuition regarding the dynamic behavior of mechanical and electromechanical systems, and help you understand how to close control loops so that you can modify a system's behavior to meet given performance specifications. At the end of the course, you should be able to design a PID controller to enable such an electromechanical system to meet typical classical control performance specifications.
- b. Student Outcomes Addressed:** n/a

## **7. Brief list of topics to be covered**

- a.** Basic concepts of vibration
- b.** Harmonic motion and analysis
- c.** Vibration with viscous damping
- d.** Feedback systems
- e.** System modeling and dynamics
- f.** Laplace transforms
- g.** Performance specifications
- h.** Stability
- i.** Analysis of feedback loops
- j.** Block diagrams
- k.** Root locus
- l.** Bode plots
- m.** Compensation -- PID controllers