

**1. Course number and name**

EE 489: Introduction to Control Systems

**2. Credits and contact hours**

3 credits, 3 lecture hours

**3. Instructor's or course coordinator's name**

Ali Saberi

**4. Textbook, title, author, and year**

Franklin, Powell, and Emami-Naeini, *Feedback Control of Dynamic Systems*,  
Prentice Hall.

*Other supplemental materials*

The textbook of Dorf and Bishop (*Modern Control Systems*) is suggested as a supplemental reference. Also, lecture notes are provided to the students.

**5. Specific course information**

a. *Catalog description:* EE 489 provides an introduction to classical control theory. Building on students' background in modeling and analyzing electrical systems, this course will study how dynamical systems can be controlled (modified) through feedback, so that they achieve desired design goals. Throughout the course, these control methods will be applied to realistic examples from several disciplines.

b. *Prerequisites or corequisites:* Completion of EE 321 with grade of C or better. EE 341: Signals and Systems concurrent registration in EE 341, or permission of instructor.

**6. Specific goals for the course**

EE 489 provides a comprehensive introduction to the analysis and design of feedback control systems. By the end of the course, students should be able to

- Develop linear-systems abstractions and pose control-design problems for a range of electrical, mechanical, and heat/fluid-flow devices;
- Solve linear systems, and characterize their stability and performance;
- Analyze feedback control systems, by computing closed-loop responses (given tracking inputs and possible disturbances), and characterizing closed-loop stability and performance;
- Design feedback control systems, by choosing appropriate control architectures, and applying root-locus- and frequency-response-based design techniques.

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

- General Concepts of Feedback Control (1a,1b,1c,1d,1e)
- Dynamic Models and Dynamic Response (2a,2b,2c,2e)
- Stability Analysis (6,7a,7f)
- Basic Principles of Feedback (6)
- Root-Locus Analysis and Design (2a,2b,2c,2e,6,7a,7f)

- Frequency-Response Analysis and Design (2a,2b,2c,2e,6,7a,7f)  
State Space Design (Modern Control Design) (2a,2b,2c,2e,6,7a,7f)