

- Course Number and Title: M E 452. Control System Design
- Catalog Description: Introduction to the control of dynamical systems, with a focus on mechanical and aerospace systems. Includes basic systems theory, feedback and stabilization, and applications of methods to design of control systems in mechanical and aerospace engineering.
- Credit Hours: 3 Credits (3)
- Prerequisite(s) / Corequisite(s): Prerequisite(s): ENGR 234, M E 328 and M E 261
Corequisite(s): None
- Required: Elective for BSME or BSAE Degree
- Course Availability: Fall and Spring Semesters
- Instructor (Usual): Dr. Mahdi Haghshenas-Jaryani (See <https://mae.nmsu.edu/people/faculty.html>)
- Textbook:
 - 1) “**Modern Control Engineering**”, K. Ogata, 5th Edition, Pearson, 2010, 9780136156734.
 - 2) “**Modern Control Systems**”, R. C. Dorf and R. H. Bishop, Pearson, 14th edition, 2021, 9780137307258.
 - 3) “**Feedback Systems**”, K. J. Astrom and R. M. Murray, Second Edition, [available online](#)
- Course Learning Objectives: After completing this course, a student should be able to:
 - 1) Construct a block diagram of control systems to find a transfer function for a dynamical system.
 - 2) Derive State Space representation of a dynamical systems.
 - 3) Analyze control systems by utilizing various linear control theories such as root-locus design method, bode, and lead/lag compensation techniques.
 - 4) Design and simulate PID control systems for mechanical/aerospace engineering applications.
- Topics Covered: Laplace transform, block diagram, state-space representation, transfer function, sensitivity and disturbance rejection, transient and steady-state response analysis and tracking, Routh-Hurwitz stability criteria, root-locus design method, frequency response analysis, bode diagram, compensation techniques, and PID controllers.