

**ME 436: Mechanical Engineering Control
Fall 2013**

Loc./Time: Engr A: Room 219, on TuTh: from 5:00 PM to 6:15 PM (Lecture)
Engr A: Room 219, on Tu 4:00 PM to 4:50 PM (Recitation hour)

Instructor: Om P. Agrawal
Office: Engineering/Technology, E15
Email: om@engr.siu.edu
Phone: 453-7090
Office hr.: TuTh 2 PM to 4 PM

Textbook: Dynamic Modeling and Control of Engineering System (3rd Edition)
Authors: B. T. Kulakowski, J. F. Gardner, and J. L. Shearer
Publisher: Cambridge University Press

Ref. book: System dynamics by Ogata
Modeling and Analysis of Control Systems by Close and Frederick

Course Description:

Teach students analytical and numerical tools and techniques for modeling, analysis, design and control of mechanical, electrical, thermal, fluid, and combinations of dynamic systems.

Topics to be Covered:

1. Modeling of Translational and Rotational Systems,
2. Input-Output and State Space Models,
3. Analytical Solutions of First- and Second-Order Models,
4. Simulation of Dynamic Systems and Their SIMULINK Implementations,
5. Modeling of Electrical, Thermal, Fluid and Mixed Systems
6. System Transfer Functions and Frequency Analysis
7. Closed Loop Systems and Stability Analysis

Grading tools and their weights:

Homework: 10%

I will assign 3 problems everyday (tentatively). I may suggest other problems for practice.

Tests and Final:

3 best tests: 20% each (Total = 60%) and Final: 30%

Note:

1. **The final will be comprehensive.**
2. **We will collect homework assignments but we will not carefully examine them. You will receive full credit for making a sincere effort. You will not get credit if you do not submit the assignment or if you do not make a sincere effort.**

Final Exam. Time and date: 5:50 PM to 7:50 PM, May 8, 2014

Grade scale: A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: 0-59.

Note: If the overall performance of the class is poor, then I may curve the grade, provided students are coming to the classes and the recitation hours, doing the homework and submitting them on time, and visiting me and the TAs during our office hours.

Incomplete: Incomplete grades will be given only in extreme cases such as a serious accident or illness.

Course prerequisite: ME 261, Engineering 300(?), 335, 351

Most importantly, students are expected to know the following:

1. Dynamics: Free-body diagrams for translational and rotational motion, equations of motion
2. Matrix/linear algebra (You should know what a matrix is, how to organize equations in matrix form, matrix additions and multiplications)
3. Differential equations, you should be able to solve first, second and higher order differential equations
4. Complex numbers: You should know what a complex number is, how to convert a complex number from a Cartesian form to a polar form and vice versa, addition, subtraction, multiplication and division of complex number, identifying real and imaginary parts/expressions of a complex numbers.
5. Matlab programming (A knowledge of Matlab/Simulink will be helpful. However, I will discuss this in class)

Caution: At times, you will be dealing with long equations and long derivations. You should be ready for that.

Note: Additional information about registration for a course could be found at:

<http://registrar.siu.edu/schedclass/index.html>

Emergency Procedures

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at www.bert.siu.edu, Department of Safety's website www.dps.siu.edu (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.