



蘇州大學
Soochow University

ENR 340 Machinery Dynamics

Summer 2023

Course Credits: 4

Contact Hours: 55 hours

Instructor: TBA

Email:TBA

COURSE OBJECTIVES

Topics in this course will include Kinematic and Kinetic analysis of mechanisms. Rigid and flexible multi-body assembly models in two and three dimensions. Use of solid modeling, dynamic analysis and finite element methods. Study of loads on linkages, cams, gears as integral functioning components of machines, ground and space vehicles. Study of forces and moments in machinery under impulsive and impact forces, balancing, and elements of vibration.

Upon Completion of this Course, students will be able to:

1. Understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms
2. Understand the undesirable effects of unbalances resulting from prescribed motions in mechanism
3. Understand the effect of Dynamics of undesirable vibrations and the principles in mechanisms used for speed control and stability control
4. Perform simulations of rigid multi-body assemblies and calculation of loads, dynamic forces, energy and momentum
5. Analyze forces and moments in two and three dimensions under impulsive impact forces and collisions.

PREREQUISITES

CEN 110 Introduction to Engineering Design

GRADING



Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
Quizzes	10 Points
Lab Reports	20 Points
Midterm 1	15 Points
Midterm 2	15 Points
Final Exam	40 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Kinematics and Dynamics of Machinery, 3rd Ed. by Wilson and Sandler, Prentice-Hall, 2003.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	<p>Topics: Topic 1: Basic Properties of Dynamics Topic 2: Coordinate Systems Topic 3: Planar Motion of Rigid Bodies, Newton's Second Law Topic 4: free body diagrams, static and dynamic friction</p> <p>Assessments: Quiz#1 Lab Reports#1</p>



Module 2	Topics: Topic 5: Inclined Plane Motion, Relative Motion Topic 6: Velocity and Acceleration Diagrams Topic 7: Rotating and Reciprocating Components Topic 8: Rigid Body Motion with Applied Forces and Torques Assessments: Quiz#2 Lab Reports#2
Module 3	Topics: Topic 9: Force Analysis Topic 10: Inertia Force and Inertia Torque Topic 11: Dynamic Analysis in Reciprocating Engines Topic 12: Mass moments of inertia Assessments: Midterm#1 Lab Reports#3
Module 4	Topics: Topic 13: Parallel Axis Theorem, Simple and Complex Bodies Topic 14: Thin Plates and Experimental Measurement Topic 15: Mechanical Power Transfer Systems Topic 16: Fixed Axis and Epicyclic Assessments: Midterm#2 Lab Reports#4
Module 5	Topics: Topic 17: Flat and Vee Belts Topic 18: Hooke's Joints, and Friction Clutches Topic 19: Disk, Cone and Centrifugal Topic 20: Mechanism for Control Assessments: Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning



and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.



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DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.