



蘇州大學
Soochow University

ENR 322 Dynamics of Machine

Summer 2023

Course Credits: 4

Contact Hours: 55 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

ENR 322 is a comprehensive course that aims to familiarize students with the concepts of motion and forces in machines, while exploring the analysis and design of mechanical systems. The course focuses on understanding the principles of dynamics and their application to machine components and mechanisms. Topics covered include kinematics, kinetics of machines, vibrations, velocity and acceleration analysis in linkages, gears, cam and gear trains, as well as static and dynamic forces and torques in linkages. Students will apply various analytical and computational methods to analyze and predict the dynamic response of machines, enabling them to design, optimize, and troubleshoot mechanical systems efficiently.

Upon completion of this course, students will be able to:

1. Demonstrate a comprehensive understanding of the principles of motion and forces in machines;
2. Apply analytical techniques, including graphical and numerical methods, to analyze and predict the behavior of machine components and mechanisms;
3. Apply the principles of machine dynamics to real-world engineering applications, such as rotating machinery, robotics, automotive systems, and industrial machinery;
4. Enhance design skills and the ability to optimize machine components for desired performance and reliability;
5. Apply critical thinking and problem-solving techniques to real-world machine dynamics challenges.



PREREQUISITES

ENR 121 Mechanics of Materials;

MAT 120 Calculus II;

GRADING

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

ITEM	POINTS
Quizzes	20 Points
Labs	20 Points
Midterm Exam	15 Points
Project	20 Points
Final Exam	25 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:

Charles E. Wilson, Peter Sadler, Kinematics and Dynamics of Machinery, Pearson Education, 2003.

R.C. Hibbeler, Engineering Mechanics: Dynamics, 12th Edition, Pearson Education, 2010.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
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Module 1	<p>Topics: Topic 1: Introduction: Dynamics Topic 2: Mechanisms and Machines, Applications Topic 3: Kinematics of a Particle Topic 4: Curvilinear Motion Lab#1 Assessments: Quiz#1</p>
Module 2	<p>Topics: Topic 5: Kinetics of a Particle: Force and Acceleration Topic 6: Newton's Second Law of Motion, Equations of Motion Topic 7: Work and Energy Topic 8: Impulse and Momentum Lab#2 Assessments: Quiz#2 Project</p>
Module 3	<p>Topics: Topic 9: Planar Kinematics of a Rigid Body Topic 10: Relative-Motion Analysis Topic 11: Moment of Inertia, Equations of Motion Topic 12: Vibrations Lab#3 Assessments: Midterm Exam Project</p>
Module 4	<p>Topics: Topic 13: Velocity Analysis of Mechanisms Topic 14: Acceleration Analysis of Mechanisms Topic 15: Design and Analysis of Cam-and-Follower Systems Topic 16: Gears: Design and Analysis Lab#4 Project due</p>
Module 5	<p>Topics: Topic 17: Static-Force Analysis Topic 18: Dynamic-Force Analysis Topic 19: Synthesis, Final Exam Review Topic 20: Final Exam Assessments: Final Exam</p>



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 (e.g., note taking, reading course documents).



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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.

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.