

Syllabus
ME 37200 – Design Of Mechanisms
Summer 2025 (06/16/25-08/05/25)

Instructor:	Dr. Jing Zhang
Office:	SL160J; Phone: 7654957766; E-mail: zhan2437@purdue.edu
Office Hours:	By email appointment
Lecture Hours:	MW 10:30a -1:30p via Teams (Synchronous Online)
Catalog Description:	Credit 3. Class 3. Kinematic and dynamic analysis of linkages and mechanical systems. Analytical and graphical approaches to analysis. Vector loop and relative velocity/acceleration solutions. Design and analysis of cams and gears. Static and dynamic balancing. Engine Dynamics. Computer simulation-based mechanical design. Design documentation report writing, and communication
Pre-requisites:	ME 26200, ME 27200, ME 27400
Co-requisites:	None.
Textbooks	Cleghorn, William and Nikolai Dechev, Mechanics of Machines, Second Edition, Oxford University Press, 2014.
Goals:	Among the fundamental objectives of the design process are the establishment of design objectives and design criteria and the use of synthesis, analysis and iterative procedures to produce the final design. These constitute the basic learning objectives of ME 37200. The course focuses on that field of engineering theory, analysis, design and practice known as “kinematics and dynamics of machinery.” The objective of ME 37200 is for students to learn the following: 1. Position, velocity and acceleration analysis of linkages. 2. Kinematic synthesis of linkages to produce a desired motion. 3. Static and dynamic force analysis of linkages. 4. Kinematic analysis/synthesis and dynamics of cams. 5. Kinematic analysis/synthesis and dynamics of gears and gear-trains. 6. Use of CAE (Computer-Aided Engineering) and design tools in the design process of mechanical systems. 7. Iterative design process of typical mechanical systems. 8. Effective professional written and oral communication skills

	through report writing and oral presentation
Outcomes:	<p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Identify the mechanical system that satisfies the given engineering requirements. [1] 2. Describe the necessary assumptions in designing mechanical systems. [1, 4, 2] 3. Apply proper engineering principles and theories to solve open-ended design problems. [1, 2, 4] 4. Perform kinematic and dynamic analyses for mechanisms. [1] 5. Perform mechanism analysis and simulation using computer tools. [1, 6, 2] 6. Evaluate the performance of mechanical systems. [6, 1, 4, 2] 7. Design linkages, cams, gears and other machine elements for motion and dynamic force requirements. [2, 1, 6] 8. Apply CAE and design development tools in the design of mechanisms and mechanical systems [1, 6] 9. Communicate design work through written report and/or oral presentation. [3,5] 10. Explain the potential impact of designed mechanical systems on environment and society, including safety. [4] 11. Conduct Library/Internet search for existing designs. [7,4, 6] <p>Note: The letters within the brackets indicate the general program outcomes of mechanical engineering (See: ME Program Outcomes).</p>
Topics:	<ol style="list-style-type: none"> 1. Introduction. 2. Kinematic analysis of linkages and mechanisms <ol style="list-style-type: none"> a. Mobility analysis. b. Position analysis. c. Motion synthesis. d. Velocity analysis. e. Acceleration analysis. 3. Cam analysis and design. 4. Gear and gear trains analysis and design. 5. Dynamics of linkages and mechanisms 6. Balancing. 7. Flywheel 8. Cam/Engine dynamics.

Evaluation Methods:	Mid Exam 1 (take-home)	15%
	Mid Exam 2 (take-home)	15%
	Final Exam (take-home)	20%
	Homework	49%
	Survey	1%
	<i>*The instructor reserves the right to adjust the final grade based on the students' attendance and participation which are greatly encouraged.</i>	
Course Website:	Purdue.brightspace.com	

IMPORTANT POLICIES AND PROCEDURES

1. SCHEDULE AND ATTENDANCE:

- a. Lecture schedule may be adjusted based on the actual progress. Attending all classes (arriving on time), and bringing a calculator, the course textbook, and relevant handouts to class are expected.
- b. Participation in class and out-of-class discussion is encouraged. An office hour visit is welcome. Check the Announcements and Changes in the Schedule posted on BrightSpace regularly.

2. GRADING POLICY:

See the default grading scheme/ranges in Brightspace/Grades/Schemes, subject to the changes imposed by the university and school's rules.

Symbol	Start %	Assigned Value %
F	0	59
D-	60	63
D	64	66
D+	67	69
C-	70	73
C	74	76
C+	77	79
B-	80	83
B	84	86
B+	87	89
A-	90	93
A	94	96
A+	97	100

3. HOMEWORK (approx. 20 HW assignments):

- a. Do the homework with an understanding of underlying concepts and not just as a numerical problem. Assigned homework may be collected and graded either based on completion or actual working. Homework late by one day may be accepted with a written letter provided it is submitted before the posting of the solutions.
- b. Discussion among students and with the instructor about the methods for solving homework problems is encouraged, but copying the solution from each other or from any other source will be treated as academic dishonesty.
- c. **NO LATE HOMEWORK IS ACCEPTED**

4. EXAMS (two midterm exams and final exam):

The midterm exams will cover all assigned text material presented in class up to that point. The final exam may be comprehensive. The format and difficulty of the exams are similar to homework problem assignments.

An unjustified missing exam will lead to a grade be zero. There is NO MAKEUP EXAM. In rare cases, only with a documented, legitimate reason, the missed exam grade may be based on other work with appropriate adjustments.

5. WITHDRAWALS AND GRADE POSTING:

Withdrawals and grade posting will be according to school and university policies.

6. ACCESSIBILITY INFORMATION

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

The Office of Institutional Equity, which is responsible for ensuring Americans with Disability Act compliance, can be contacted with any accessibility concerns at:
Phone: (765) 494-7253; Email: equity@purdue.edu TTY: (765) 496-1343
Website:

- [Purdue's Disability Resource Center Website](#)
- [Purdue's Web Accessibility Policy](#)
- [Purdue University system-wide policy Frequently Asked Questions \(FAQs\)](#)

7. ACADEMIC INTEGRITY

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

The Purdue Honor Pledge

"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue"

8. NONDISCRIMINATION STATEMENT

Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the

exchange of ideas, and enriches campus life. See: [Purdue's nondiscrimination policy statement](#).

9. **DISCLAIMER**

Circumstances may result in changes to the assignments or schedule. Please check Brightspace often or in class discussions for announcements of any changes. The above rules are not exclusive. Additional academic rules may apply.