ME 1029: Mechanical Design II

FALL, 2025

INSTRUCTOR: Dr. Shijing Luo

OFFICE: Room 522 (New Building)

EMAIL: shijing.luo@scupi.cn

LECTURES: Thursday 08:15-11:00
Room N212, New Building

OFFICE HOURS: Wednesday: 16:30-18:30, Thursday & Friday: 13:00-17:00, or by appointment

EACHING ASSISTANT: Zixi Xu **xzx1529598198@163.com**

QQ GROUP: 1058939480

COURSE NUMBER: 312045030

CREDITS: 3 credits

TEXTBOOK:

Shigley's Mechanical Engineering Design by Richard G. Budynas and J. Keith Nisbett,10th edition, McGraw-Hill Education, 2015.

PREREQUISITE:

MEMS 1028 Mechanical Design 1
MEMS 0024 Intro to ME Design

DESCRIPTION:

This advanced course builds upon the fundamentals introduced in Mechanical Design I to tackle the synthesis, analysis, and execution of complex mechanical systems. Students will apply the learned knowledge to size their designs, deliberate the pros and cons of their designs, and systematically draw conclusions per analytical opinions.

Students will also involve in an extensive design project in this class. Students in teams will compete to develop a design for a product, applying structured design practices to real hardware.

COURSE OBJECTIVES:

It is an advanced study with focus to introduce elements frequently used in mechanical designs. As the class evolves, students will develop:

(1) functionality understanding of components in static and dynamic mechanical applications,

(2) thought process in the decision of selecting components for the targeted applications, and

(3) analysis and synthesis methodologies for evaluation of the structural risks of the selected components.

LEARNING OUTCOMES FOR THIS COURSE:

After the successful completion of this course, students should develop:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to communicate effectively with a range of audiences.

3. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

4. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

GRADE DETERMINATION:

10%: participation and in-class assignments

20%: homework

24%: exercise design projects

20%: midterm exam

26%: final exam

EXAMS:

There will be one midterm exam and one final exam.

PARTICIPATION:

On-time attendance at all class activities is expected. Meanwhile, students are encouraged to join all kinds of class activities, including attending each class, asking/answering questions in classes, and making presentations, etc. If you must miss a class due to illness or other reasons, you should take a leave from the instructor at least one day before the class.

IN-CLASS ASSIGNMENTS:

In-class assignments will be assigned to students during class hours; the topics are usually related to the latest class or new theories/techniques introduced in the same class to check students' understanding of the basic knowledge. Generally, **NO** make-up quizzes will be allowed for absences from the class, unless prior approval has been granted by the instructor or a valid emergency, supported by appropriate documentation, is provided.

HOMEWORK:

To be assigned after the lectures. Each homework is designed to build upon the material covered in the preceding lectures, and is generally due within one week, the exact due time will be announced on the Blackboard.

EXERCISE DESIGN PROJECTS:

To be assigned after the lectures. The students will have 2~ 3 weeks to do each exercise project, and the detailed requirements will be posted on BB.

The students are expected to 1) apply the learned knowledge to practice sizing their designs, 2) deliberate the pros and cons of their designs, 3) identify the failure mechanisms and define pass/fail criteria, and 4) draw systematical conclusions per analytical opinions.

All homework, assignments, and project exercises must be **handwritten**, the submissions that fails the requirements will not be accepted otherwise. Submission requirements (including due dates) for all assessments will be announced to students in class or on Blackboard. Late assignments will be deducted 30% per day and will not be accepted after 4 days (including the 4th day) or after the solutions are distributed, whichever is earlier.

GRADE Policy:

A: 90 – 100	B+: 80 – 84	B−: 73 – 75	C: 66 – 69	D: 60 – 62
A−: 85 – 89	B: 76 – 79	C+: 70 – 72	C−: 63 – 65	F: < 60

If students have any concerns regarding their grades, they may submit a rebuttal within **5 days** of the grade announcement. No rebuttals will be accepted after this period.

MATERIAL COVERED:

The intended sequent content covered in this class is shown in the following table and might be adjusted according to the class schedule.

Week	Contents	Descriptions
1 (09/11)	Introduction	Course syllabus & general introduction
2 (09/18)	Chp. 3 & 7	Interference Fit Design
3 (09/25)	Chp. 5	Failures Resulting from Static Loading
4 (10/02)	No class	Public Holiday
5 (10/09)	Chp. 8	Nonpermanent Joints
6 (10/16)	Chp. 8	Nonpermanent Joints
7 (10/23)	Chp. 8	Bolt Fatigue Loading of Tension Joints
8 (10/30)	Chp. 6	High-Cycle Fatigue Design
9 (11/06)	Review	Midterm Exam Week

10 (11/13)	Chp. 7	Shafts and Shaft Components
11 (11/20)	Chp. 7 & 13	Gear Fundamentals and Geartrain Force Analysis
12 (11/27)	Chp. 13	Gear Fundamentals and Geartrain Force Analysis
13 (12/04)	Chp. 11	Rolling Contact Bearings: Ball Bearings
14 (12/11)	Chp. 11	Rolling Contact Bearings: Ball Bearings
15 (12/18)	Chp. 11	Tapered Roller Bearings, & Bearing Mounting and Preloading
16 (12/25)	Chp. 12	Lubrication & Journal Bearings
17 (01/04)	TBD	Final Exam Week

The instructor reserves the right to extend credit for alternative assignments, projects, or presentations, and to make changes to this syllabus as needed. All changes will be announced via Blackboard and/or in class.

Copyrights:

The handouts used in this course are copyrighted. By "handouts" we mean all materials generated for this class, which include but are not limited to syllabi, in-class materials, videos, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy or distribute the handouts, unless the author expressly grants permission.

Academic Integrity:

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include but is not limited to the confiscation of the examination of any individual suspected of violating the University Policy.