

Semester Fall 2021
Course Number ME1029
Course Title Mechanical Design 2
Instructor Professor Ping C. Sui, Ph.D.
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Office Hours Tuesday 1:00-5:00PM
 Wednesday 1:00-5:00PM

Teaching Assistant Kail Liao
 E-mail: 1441766804@qq.com

Lecture Time/Room Wednesday 8:15-11:00AM
 Zone 4-204

Prerequisites MEMS 1028 Mechanical Design 1
 MEMS 0024 Intro to ME Design

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

Course Description This course is a 3 credit hour class. 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.

To facilitate the understanding, design practices will be given to students periodically. 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 Outline

Session	Class Date	Chapter	Topics	Homework
1	Sep 01	Ch.3.16, 7.8	LN00 Course Overview LN01 Press Fit Design	HW01
2	Sep 08	Ch.3.16, 7.8 5.3 – 5.5, 5.7	LN01 Press Fit Design LN02 Static Failure	HW02
3	Sep 15	Ch.06	LN03 Review: High-Cycle Fatigue Design	HW03 Design Exercise 01
4	Sep 22	Ch.06 Ch.07	LN03 Review: High-Cycle Fatigue Design LN04 Shafts and Shaft Components (7-4 Shaft Design for Stress)	HW04
5	Sep 29	Ch.07	LN04 Shafts and Shaft Components (Resume from 7-4 Shaft Design for Stress)	HW05
6	Oct 06		Section Exam 01	
7	Oct 13	Ch.11	LN07 Rolling Contact Bearings	HW06 Design Exercise 02
8	Oct 20	Ch.11	LN07B Tapered Roller Bearings; Direct/Indirect Mount; Hertzian Contact	HW07
9	Oct 27	Ch.12	LN06A Lubrication & Journal Bearings	HW08
10	Nov 03	Ch.12	LN06B Lubrication & Journal Bearings	HW09
11	Nov 10		Section Exam 02	
12	Nov 17	Ch.08	LN05A Nonpermanent Joints	HW10
13	Nov 24	Ch.08	LN05B Nonpermanent Joints	HW11
14	Dec 01	Ch.08	LN05C Nonpermanent Joints	HW12

		Ch.11	LN08A Gear Fundamentals	
15	Dec 08		Section Exam 03	
16	Dec 15	Ch.11	LN08A Gear Fundamentals	HW12 Design Exercise 03
17	Dec 22		LN08B Spur Gear Design Analysis	
18	Dec 29		LN08B Spur Gear Design Analysis	

In-Class Exercises	Hands-on calculation questions given in class to familiarize students with the lectured contents																																																
Homework	<p>Problem sets will be distributed each week after the class. Each problem set is designed to build upon the material covered in the preceding lectures and recitations.</p> <p>Homework assigned in a particular class is due at 8 AM on the day of the next class period, unless otherwise posted.</p> <p><u>Late HW will not be accepted.</u> HW missed due to unforeseeable emergencies will be handled on a case-by-case basis.</p>																																																
Design Exercises	<p>Purposes</p> <ul style="list-style-type: none"> • apply the learned knowledge to practice sizing their designs, • deliberate the pros and cons of their designs, and • Identify the failure mechanisms and define pass/fail criteria • Draw systematical conclusions per analytical opinions. <p>Duration: ~1-2 Weeks for each DE Detailed requirements for DE report will be furnished later.</p>																																																
Exams	<p>Three section exams.</p> <p>Section exams will be fast-paced and computation-intensive. Purpose is to test student's proficiency and familiarity with the section contents.</p> <p>The exams in this course will be open-book and open-note.</p> <p><u>No make-up will be given for the missing exam.</u> Exams missed due to unpredictable events will be dealt with on a case-by-case basis.</p>																																																
Exam Calculator	<p>Don't forget to bring one to the exams. You will need it.</p> <p>No programmable calculator of any kind is permitted in ME exams.</p> <p>Students can use their calculator of choice for other assignments.</p>																																																
Grades	<p>In-Class Exercise: 10%</p> <p>Homework: 25%</p> <p>Section Exams: 35%</p> <p>Design Exercises: 30%</p> <p>附件：等级成绩和百分成绩、绩点对照表</p> <table border="1" data-bbox="446 1339 1295 1606"> <tr> <td>字母等级</td> <td>A</td> <td>A-</td> <td>B+</td> <td>B</td> <td>B-</td> <td>C+</td> <td>C</td> <td>C-</td> <td>D+</td> <td>D</td> <td>F</td> </tr> <tr> <td>中文等级</td> <td colspan="2">优秀</td> <td colspan="2">良好</td> <td colspan="2">中等</td> <td colspan="3">合格</td> <td colspan="2">不合格</td> </tr> <tr> <td>百分制</td> <td>100-90</td> <td>89-85</td> <td>84-80</td> <td>79-76</td> <td>75-73</td> <td>72-70</td> <td>69-66</td> <td>65-63</td> <td>62-61</td> <td>60</td> <td><60</td> </tr> <tr> <td>绩点</td> <td>4</td> <td>3.7</td> <td>3.3</td> <td>3</td> <td>2.7</td> <td>2.3</td> <td>2</td> <td>1.7</td> <td>1.3</td> <td>1</td> <td>0</td> </tr> </table>	字母等级	A	A-	B+	B	B-	C+	C	C-	D+	D	F	中文等级	优秀		良好		中等		合格			不合格		百分制	100-90	89-85	84-80	79-76	75-73	72-70	69-66	65-63	62-61	60	<60	绩点	4	3.7	3.3	3	2.7	2.3	2	1.7	1.3	1	0
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Class Attendance	<p>Students are expected to attend every class period.</p> <p>Early is on time, on time is late. As a courtesy to your fellow classmates, be punctual and arrive no later than the class starting time.</p>																																																
Academic Honesty	<p>All of us are equally responsible for ensuring a fair and positive learning environment.</p> <p>Students are permitted to discuss homework assignments together, but should do their own work when preparing a problem solution.</p> <p>All exams are to be completed without unauthorized assistance. Any student caught cheating on an assignment or exam will receive disciplinary action, up to and including receiving a grade of "F" for the course.</p>																																																