

|                           |  |
|---------------------------|--|
| <b>Semester</b>           | Fall 2024  |
| <b>Course Title</b>       | ME1029 Mechanical Design 2, Section 01   |
| <b>Instructor</b>         | Professor Ping C. Sui, Ph.D.<br>Office: N502 (Jiang-An South Campus)<br>e-mail: <a href="mailto:ping.sui@scupi.cn">ping.sui@scupi.cn</a>   |
| <b>Office Hours</b>       | Tuesday 13:00-17:00<br>Wednesday 13:00-17:00   |
| <b>Teaching Assistant</b> | 徐子翕(E-mail: 2020141520068@stu.scu.edu.cn)  |
| <b>Lecture Time/Room</b>  | Wednesday 8:15-11:00AM, Room: N213 (Jiang-An South Campus)   |
| <b>Prerequisites</b>      | MEMS 1028 Mechanical Design 1<br>MEMS 0024 Intro to ME Design  |
| <b>Textbook</b>           | Shigley's Mechanical Engineering Design by Richard G. Budynas and J. Keith Nisbett, 10th edition, McGraw-Hill Education, 2015.   |
| <b>Course Description</b> | 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.<br>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. |
| <b>Course Outcome</b>     | It is expected that the students will have good understanding of general design practices facilitated by industrial companies. Students will effectively apply the learned knowledge to size their designs, deliberate the pros and cons of their designs, and systematically draw conclusions per analytical opinions.  |

#### Course Outline

| Session | Class Date                  | Chapter                 | Topics  | Assignments                      |
|---------|-----------------------------|-------------------------|---|----------------------------------|
| 1       | Sep 04                      | Ch.3.16, 7.8            | LN00 Course Overview<br>LN01 Interference Fit Design                                      | HW01                             |
| 2       | Sep 11                      | 5.3 – 5.5, 5.7<br>Ch.08 | LN02 Failures Resulting from Static Loading<br>LN03A Nonpermanent Joints                  | HW02                             |
| 3       | Sep 18                      | Ch.08                   | LN03A Nonpermanent Joints<br>LN03B Nonpermanent Joints                                    | HW03<br><b>Design Exercise 1</b> |
| 4       | Sep 25                      | Ch.08                   | LN03B Nonpermanent Joints<br>LN03C Nonpermanent Joints<br>Preparation of Design Exercises | HW04                             |
| 5       | <b>Oct 02</b>               |                         | <b>Holiday</b>  |                                  |
| 6       | Oct 09                      | Ch.06                   | LN04 Review: High-Cycle Fatigue Design  | HW05                             |
|         | <b>Friday PM<br/>Oct 11</b> |                         | <b>Section Exam 01</b>  |                                  |
| 7       | Oct 16                      |                         | <b>No Class (Substitute by Oct 11 Exam)</b>   |                                  |
| 8       | Oct 23                      | Ch.07                   | LN05 Shafts and Shaft Components  | HW06                             |
| 9       | Oct 30                      | Ch.07                   | LN05 Shafts and Shaft Components  | HW07                             |
| 10      | Nov 06                      | Ch.11                   | LN06A Gear Fundamentals<br>LN06B Geartrain Force Analysis                                 | HW08                             |
| 11      | <b>Nov 13??<br/>TBA</b>     | Ch.11                   | <b>Section Exam 02</b>  | HW09                             |

|    |                         |       |  |                                      |
|----|-------------------------|-------|--|--------------------------------------|
| 12 | Nov 20                  |       | LN07A Rolling Contact Bearings: Ball Bearings                                  | <b>Design Exercise 2</b>             |
| 13 | Nov 27                  | Ch.11 | LN07A Rolling Contact Bearings: Ball Bearings                                  | HW10                                 |
| 14 | Dec 04                  | Ch.11 | LN07B Rolling Contact Bearings: Tapered Roller Bearings; Direct/Indirect Mount | HW11                                 |
| 15 | Dec 11                  |       | LN08A Lubrication & Journal Bearings   | HW12<br><b>Design Exercise 2 Due</b> |
| 16 | Dec 18                  | Ch.12 | LN08B Lubrication & Journal Bearings   | HW13                                 |
| 17 | <b>Dec 25??<br/>TBA</b> | Ch.12 | <b>Section Exam 03</b>   |                                      |
| 18 | Jan 01                  |       | No Class   |                                      |

|                    |  |       |       |       |       |       |       |       |       |     |     |   |   |      |    |  |    |  |    |  |    |  |  |     |  |     |        |       |       |       |       |       |       |       |       |    |     |    |   |     |     |   |     |     |   |     |     |   |   |
|--------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|---|---|------|----|--|----|--|----|--|----|--|--|-----|--|-----|--------|-------|-------|-------|-------|-------|-------|-------|-------|----|-----|----|---|-----|-----|---|-----|-----|---|-----|-----|---|---|
| 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"> <li>• apply the learned knowledge to practice sizing their designs,</li> <li>• deliberate the pros and cons of their designs,</li> <li>• Identify the failure mechanisms and define pass/fail criteria, and</li> <li>• Draw systematical conclusions per analytical opinions.</li> </ul> <p>Duration: ~2-3 Weeks for each DE<br/>Detailed requirements for DE report will be furnished later.</p>   |       |       |       |       |       |       |       |       |     |     |   |   |      |    |  |    |  |    |  |    |  |  |     |  |     |        |       |       |       |       |       |       |       |       |    |     |    |   |     |     |   |     |     |   |     |     |   |   |
| Section 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> <p>Bring one engineering calculator to the exams. You will need it.</p> <p>No programmable calculator of any kind is permitted in ME exams.</p>  |       |       |       |       |       |       |       |       |     |     |   |   |      |    |  |    |  |    |  |    |  |  |     |  |     |        |       |       |       |       |       |       |       |       |    |     |    |   |     |     |   |     |     |   |     |     |   |   |
| Grades             | <p>In-Class Exercises: 10%</p> <p>Homework: 15%</p> <p>Section Exams: 45%</p> <p>Design Exercises: 30% (DE01: 10%, DE02: 20%)</p> <p><b>No curving of the final grades.</b></p> <p>附件：等级成绩和百分成绩、绩点对照表</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <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>&lt;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 |
| 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   |   |   |      |    |  |    |  |    |  |    |  |  |     |  |     |        |       |       |       |       |       |       |       |       |    |     |    |   |     |     |   |     |     |   |     |     |   |   |
| 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 involved in or with academic dishonesty will be dealt with in the strictest manner regardless the extent of involvement.</p>   |       |       |       |       |       |       |       |       |     |     |   |   |      |    |  |    |  |    |  |    |  |  |     |  |     |        |       |       |       |       |       |       |       |       |    |     |    |   |     |     |   |     |     |   |     |     |   |   |

|  |   |
|--|---|
|  | <p>Students are permitted to discuss homework assignments together but should do their own work when preparing a problem solution.</p> <p>Students caught cheating will receive disciplinary action, including receiving a grade of “F” for the course.</p> |
|--|---|