

SYLLABUS

MAE 413- 001and 605
Design of Mechanical Systems
Dr. Eischen
NC State University

TuTh 1:30-2:45PM 2213 EBIII

Fall Semester 2024

Moodle Link:

<https://moodle-courses2425.wolfware.ncsu.edu/course/view.php?id=2388>

<u>Instructor:</u>	J. W. Eischen
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Office Hours(Zoom and in office 3272):	Tue, Thur 12:30-1:15PM
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Office:	
Office Hours:	

<u>Weekly Schedule</u>	
<u>Week</u>	<u>Topics</u>
1	Introduction. Use of Course Website. Report Writing. Project Description and Group Structure. Design of nonpermanent joints- screws and fasteners (Chapter 8).
2	Design of nonpermanent joints- screws and fasteners (Chapter 8). Design of permanent joints- welds and bonds(Chapter 9)
3	Design of permanent joints- welds and bonds(Chapter 9).
4	Design of mechanical springs(Chapter 10).
5	Design of rolling-contact bearings (Chapter 11)
6	Design of lubrication and journal bearings (Chapter 12).
7	Design of lubrication and journal bearings (Chapter 12). Design of gears (Chapter 13).
8	Design of gears (Chapter 13) . Design of spur and helical gears (Chapter 14).
9	Design of spur and helical gears (Chapter 14). Engineering Ethics presentation.
10	Flex week
11	Design of clutches, brakes, and flywheels (Chapter 16).
12	Exam review and Exam
13	Design of Shafts and Axles- (Chapters 7&18)
14	Wrap up Design of shafts and axles.
15	Design analysis films, project wrap-up

Course Prerequisites/Co-requisites

Preq: MAE 315 and (MAE 316 or MAE 371)

Textbook:

Shigley's Mechanical Engineering Design, Budynas and Nisbett, 10th Edition, McGraw Hill.

This book will be the reference for the development of component analysis. The second half of the book will be thoroughly covered.

http://highered.mcgraw-hill.com/sites/0073398209/information_center_view0/

Supplementary References on Mechanical Design:

Engineering Design: A Systems Perspective, Dr. Bill Fortney (\$30)

https://www.amazon.com/Engineering-Design-Perspective-William-Fortney/dp/1987483413/ref=sr_1_1?ie=UTF8&qid=1531504704&sr=8-1&keywords=fortney+design

Solving Engineering Problems, Dr. Carl Zorowski (\$12)

<https://www.amazon.com/Solving-Engineering-Problems-Carl-Zorowski/dp/1545299919>

Grading:

Homework (check off grading, full solution postings)	15%
Midterm(Thurs Oct 24th , open book exam)	25%
1 mini + 2 full Design Projects (group)	60%

Default Grading Scale:

$97 \leq A+ \leq 100$

$93 \leq A < 97$

$90 \leq A- < 93$

$87 \leq B+ < 90$

$83 \leq B < 87$

$80 \leq B- < 83$

$77 \leq C+ < 80$

$73 \leq C < 77$

$70 \leq C- < 73$

$67 \leq D+ < 70$

$63 \leq D < 67$

$60 \leq D- < 63$

$0 \leq F < 60$

Grades may adjusted up from this scale at the discretion of the instructor- this will done on an individual student basis

Student Learning Objectives

The students will be asked to demonstrate their knowledge of the material covered in MAE 413 through their mastery of the following course objectives. Through the study of MAE 413 the student will be able to:

1. Design basic mechanical components including but not limited to: bolted joints, weldments, springs, rolling contact bearings, journal bearings, gears, brakes, clutches, flexible drive elements, shafts, and axles.
2. Find essential information for design purposes from WorldWideWeb sites of manufacturers and suppliers.
3. Integrate background developed in the physical sciences, engineering sciences and mathematics to solve real world design problems. Solve open-ended problems that contain superfluous or insufficient information and require development of additional data for analysis.
4. Create technical reports that describe the context and significance of a design problem, and the procedures/methods used to solve the problem.

Instructor's Academic Integrity Statement:

- The University's policy on academic integrity found may be found in the Code of Student Conduct

- Students will be expected to abide by the following NC State Honor Pledge on exams and other assignments as noted by the instructor.

"I have neither given nor received unauthorized aid on this test or assignment."

Statement for Students with Disabilities:

"Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation

www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.28.php "

Mental Health Awareness:

As a student you may experience a range of personal issues that can impede learning, such as strained relationships, increased anxiety, alcohol/drug concerns,

feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may impact your ability to participate in daily activities. It is very important that you have a support system and that you ask for help when you are struggling. The Counseling Center at NC State offers confidential mental health services for full time NC State students, including same-day emergency services. Please visit <https://counseling.dasa.ncsu.edu/> to get connected.

Additionally, the MAE department is committed to the success and wellbeing of our students. Please go to <https://www.mae.ncsu.edu/mae-wellness/> to learn about opportunities to get involved and stay healthy.