

Time: 12:50 – 1:40 MWF
Location: 136 DeBartolo Hall

Instructor:

Diane Wagner **Phone:** 1-5735
145 Multidisciplinary Research Building **e-mail:** dwagner@nd.edu

Office Hours: Tuesday 2:30-3:30 pm in the basement of LaFortune, Thursday 1:30 – 3:00 in my office, or by appointment.

Website: Information on the class can be found at
<http://www.nd.edu/~dwagner/courses/20241/20241.html>
including this syllabus and homework/quiz schedule.

Prerequisites: AME 20221 Statics, MATH 20550 Multivariable calculus

Required text: Craig, *Mechanics of Materials*, 2nd Edition, John Wiley and Sons, ISBN: 0-471-33176-7

Goals:

1. To understand the fundamental concepts of solid mechanics underlying the design and analysis of all mechanical and structural systems. These concepts include:
 - stress, strain and deformation in tension, compression, shear, torsion, and bending
 - mechanical properties of commonly used engineering materials
 - transformations of stress and strain
 - combined loading
2. To apply the above concepts to new situations and demonstrate proficiency in problem solving.

Assessment:

Your performance in this course will be measured by weekly homework quizzes, laboratory reports, and three examinations.

Grading:

Homework Quizzes	15%
Exam #1-2	35%
Final Exam	25%
Laboratory	25%

Grades will be assigned on a curve, with the median grade in the “B” range. I will be aiming for a distribution that looks like this: A: 92-100; A-: 89-91; B+: 86-88; B: 80-85; B-: 78-79; C+: 76-77; C: 70-75; C-: 68-69 D: 60-67; F: 59 and below.

Homework:

Suggested problem assignments will be given from the text, but will not be collected or graded. All the answers are found in the back of the book. You are responsible for knowing how to do the suggested problems.

Homework Quizzes:

Your problem-solving ability will be assessed in weekly homework quizzes. On the assigned date, between 7pm and midnight, you will need to login to the class Concourse website and take a timed quiz (30 to 45 minutes long) that will be based on the most recent problem assignment. The quizzes will be mostly multiple choice format, with approximately 4 questions each quiz. There will be no partial credit given for a question, and no credit will be given if you are unable to answer the

questions within the time limit. It is recommended that you have a functioning calculator, paper, and a writing instrument with you when you take the quizzes.

Laboratory:

You will receive a separate syllabus for the laboratory component of this course. Information on the laboratory can be found at <http://www.nd.edu/~dwagner/courses/21241/21241.html>

Recitation:

A teaching assistant will be available at recitations to do additional example problems and to be available to answer questions. Attendance at recitation sections is optional.

Examinations:

Two examinations will be given during the semester along with a final exam. *Exam #1 will cover material presented in the first 5 weeks of class, and exam #2 will cover material from the second 5 weeks. The final exam will be comprehensive, but concentrated on the material from the last 5 weeks of class.* An instructor or teaching assistant will be available during the exams to answer questions related to the exam. Exams will be closed book format but an equation sheet will be allowed.

Policies:

Exams must be taken as scheduled, except in the case of illness or serious emergency. Contact the instructor *before the exam* (if possible) to schedule a makeup exam. The makeup exam must be taken within one week of the original exam date.

Illnesses and emergencies should be documented with an appropriate excuse from the office of residential life.

Grading corrections:

Any disputes over grading on the exams or lab reports should be brought to the instructor. *Do not* take questions related to grading to the TA's. If the dispute involves other than an arithmetic error in your score, the entire exam or homework will be re-graded. This may result in a net loss of points. Submit within *one week* of receiving the graded item:

- The original, unaltered lab report or exam.
- A written description of the grading error
- What you believe a fair score for the problem should be
- Do not submit a classmates exam or lab report as evidence of a grading error

Honor code:

Students should be familiar with the University Honor Code.

- Exams will be self-proctored. Working together, asking questions of classmates, or assisting others on exams is prohibited. Students are obliged, under the honor code, to report any improprieties during the exam. The instructor or a teaching assistant will be present to answer questions only, not as a proctor.
- Working together on problem assignments is encouraged; however, your answers on the quizzes should represent your own understanding of the material.
- Additions, amendments, or corrections to this syllabus may be made throughout the semester via in-class announcements, handouts, or e-mail.

Week	Date	Lecture Topics	Reading	Suggested Problems	Quiz Date
1	1/14 - 1/16	Normal Stress and Strain	1.1 – 2.6	Ch 2: 2-3, 2-5, 2-15, 3-5, 3-13	1/21
2	1/19 - 1/23	Shear Stress Design	2.7 - 2.10	Ch 2: 7-3, 7-7, 7-9, 7-13, 8-3, 8-11, 9-9	1/28
3	1/26 – 1/30	Axial Loading	2.11 – 2.13 3.1 – 3.4	Ch 2: 13-5 Ch 3: 3-5, 3-9, 4-7, 4-9, 4-15	2/4
4	2/2- 2/6	Axial Loading	3.5-3.8	Ch 3: 5-5, 5-9, 5-13, 6-5, 6-11, 7-3	2/11
5	2/9 - 2/13	Torsion	4.1-4.8	Ch 4: 3-7, 3-9, 3-13, 4-5, 5-7, 6-3, 6-9, 8-11	2/18
6	2/16 - 2/20	Shear and moment diagrams	5	Ch. 5: 2-13, 2-19, 4-23, 4-29, 5-5, 5-7	2/25
7	2/23 - 2/27	Stresses in Beams	6.1-6.4	Ch 6: 2-3, 3-3, 3-11, 3-25, 4-3, 4-15	3/4
February 23		7 - 8:15 pm	Exam #1	TBD	
8	3/2-3/6	Stresses in Beams	6.5, 6.8-6.11	Ch 6: 5-3, 5-5, 8-11, 8-13, 10-17, 11-1, 11-9	3/18
3/9 – 3/13		Spring Break		Have some fun!	
9	3/16 - 3/20	Deflection of beams	7.1-7.4	Ch 7: 2-3, 3-5, 3-13, 3-25, 3-29, 4-3, 4-13	3/25
10	3/23 - 3/27	Deflection of beams	7.5-7.7	Ch 7: 5-3, 5-13, 5-17, 6-15, 6-35, 6-47	4/1
11	3/30 - 4/3	Stress and strain transformation	8.1-8.5	Ch 8: 3-3, 3-19, 4-5, 4-11, 5-11, 5-12	4/15
12	4/6 - 4/8	Stress and strain transformation	8.6-8.9	Ch 8: 6-3 [#] , 6-9 [#] , 8-7, 8-9, 9-5, 9-9 <small>[#] also solve using the eigenvalue method</small>	4/19
April 7		7 - 8:15 pm	EXAM #2	TBD	
13	4/15 - 4/17	Combined loading	9.1 - 9.4	Ch 9: 2-7, 2-13, 3-1, 4-5, 4-9, 4-13	4/22
14	4/20 - 4/24	Energy Methods	11.1-11.5	Ch 11: 3-5, 3-27, 3-33, 5-15, 5-17	4/29
15	4/27 – 4/29	Buckling, Review	10.1-10.3	Ch 10: 2-5, 3-11	4/29
May 4		4:15-6:15 pm	FINAL EXAM	TBD	

*Due dates may be adjusted by in-class announcements