

MAE 343/353 Intermediate Mechanics Fall 2024

MAE 343-001/CRN 80385, 353-001/CRN 87857, TU-TR 9:30-10:45, ESB G39

MAE 343-002/CRN 85990, 353-002/CRN 87858, TU-TR 9:30-10:45, ESB 801

Updated (but subject to change): October 14, 2024.

Instructor: Ever Barbero, ejbarbero@mix.wvu.edu << only private matters, regular business hrs.

Office hours: Tuesday/Thursday 8:00—9:30 & 10:45—noon. ESB 715.

TA: Masoud Mohammadhi, mm00133@mix.wvu.edu , Office hours: TBA

Forum: <http://cadec-online.com/forum> (bookmark it on your phone) << All communications done here!

Your **username** is your mix **handle** (text before @mix.wvu.edu). Your **password** is automatically generated, unknown to me, and sent from forum@cadec-online.com to your mix email (*check your spam folder!*).

Homework: No Engineering Connect access card needed. Instead, free access provided at:

<https://webwork-hosting.runestone.academy/webwork2/wvu-barbero-mae343-fall2024> (bookmark it on your phone). **Username:** your mix handle (everything before the @ symbol). **Password:** To be provided in class.

- Hmwk due date (0% grade after that) is 12 days after Hmwk opening date
- Hmwk reduced scoring date is (50% grade after that) is 7 days after Hmwk opening date.
- Allowed error, as a percentage, for numerical comparison of answers vs. correct answer = 2% (unless noted otherwise on specific problems).

Textbook-required (check new post in the Forum): Budynas, R.G. and Nisbett, J. K., Shigley's Mechanical Engineering Design, 10th Edition. ISBN-13: 978-0073398204

Prerequisites: MATH 251 (C or better) and MAE 243.

Course Objective: This course expands knowledge in mechanics of materials by considering aspects such as basic elasticity, failure theories, and energy methods, buckling of columns, unsymmetrical bending, and basics of fatigue, fracture, and material science. The use of computers for the analysis of practical examples is encouraged.

ABET Outcomes:

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

-- Ability to simulate material and structural behavior using available property data, loads, and geometry.

Key competences (mastery required on all of them to pass the course):

(1) FBDs, shear and moment diagrams.

(2) Multi-axial failure criteria. Ductile failure. Distortion energy.

(3) Understanding and calculating principal stresses.

(4) Stress concentration factors. Apply stress concentration factors to ductile fatigue problems.

(5) Fatigue with the five different failure theories.

(6) Understand the endurance-limit modifying factors.

TENTATIVE SCHEDULE (***)

Week	Date	Day	Topic	PPT	Book sect	Homework
1	8/22	TR	Syllabus	Webwork, forum		
2	8/27	TU	243 review	Statics I, II	3.1	
	8/29	TR	243 review	Statics III, IV	3.1	Hmwk 1
3	9/3	TU	243 review	M/V diags	3.1	
	9/5	TR	Mohr 2D	Mohr-2D	3.1	Hmwk 2
4	9/10	TU	2D stress	Stress-I	3.4,.5,.7	
	9/12	TR	3D stress	Stress-II	3.6	Hmwk 3
5	9/17	TU	Mohr 3D, Mlab	Mohr-3D	3.1	
	9/19	TR	2PB circ. sect.	Stress-III	3.1	Hmwk 4
6	9/24	TU	2PB other sect.	Stress-IV	3.1	
	9/26	TR	Materials	Mat.I,II,III	2.1-2.4	Hmwk 5
7	10/1	TU	Midterm	Paper exam, inc. H5		
	10/3	TR	Tresca (yield)	Zoom, Tresca	5.3,.4	Hmwk 7
8	10/8	TU	von Mises	Zoom, von Mises		
	10/10	TR	Fall break			x
9	10/15	TU	BMC (yield)	Brittle MC	5.5	
	10/17	TR	SCF	Stress concentration	3.13, 5.2	Assign H8
10	10/22	TU	Fracture	Fracture I, II	5.12	
	10/24	TR	Fracture	Fracture III	5.12	Assign H9
11	10/29	TU	Fatigue 1&2	Intro+stress-life	6.1-6.4	
	10/31	TR	Fatigue 3&4	Specimen&component	6.7-6.9	Assign H10
12	11/5	TU	Election day	No lecture		
	11/7	TR	Fatigue 5&6		6.1	Assign H11
13	11/12	TU	Fatigue 7&8		6.11-6.13	
	11/14	TR	Fatigue 9&10		6.14	Assign H12
14	11/19	TU	Fatigue 11		6.15	
	11/21	TR	Review			Assign H13
15	11/26	TU	Thanksgiving	No lecture	x	x
	11/28	TR	Thanksgiving	WVU closed	x	x
16	12/3	TU	Deflections	Zoom	4.1-4.4	
	12/5	TR	Buckling	Zoom	4.10-4.12	Assign H14
17	12/10	TU	Self-study	No lecture		
	12/12	TR	Self-study	No lecture		
18	12/19	TR	Final S001	5PM - check (*)		
	12/20	FR	Final S002	11AM - check (*)		

check

(*)

<https://registrar.wvu.edu/calendars/final-examination-schedule>

GRADING

Item	Points
Homework	60 (no make up to improve your grade if you slack on this)
Midterm	20 (no make up to improve your grade after this)
Final (*)	20
Grade	No-curving
A	90+
B	80+
C	70+
D	60+
F	<60

(*) Schedule of finals (double check): <https://registrar.wvu.edu/calendars/final-examination-schedule>

(**) Disability accommodations: <https://accessibilityservices.wvu.edu/academic/testing/testing-center>

(***) Holidays and other important dates, confirm here: <https://provost.wvu.edu/academic-calendar/weeks-of-instruction>

Homework: Assigned weekly. Answers due electronically by the *reduced scoring* date/time. Homework accepted up to immediately following lecture, with 50% penalty (called *due date* in Webwork).

Exams: In-classroom. The instructor/proctor does not answer “content” questions during exams, only clarifications.

Midterm (s), Quizzes, and Final Exam policy: All midterm exams are comprehensive. No make ups except documented illness (doctor’s note saying for what dates you are incapacitated) or WVU **sanctioned** excuses. If you have a conflict that it is not **sanctioned** by WVU, it is YOUR responsibility and the ADVISOR/COORDINATOR of such event’s responsibility to have WVU **sanction** your conflict or event. Events or excuses **not sanctioned** by WVU are unacceptable, and they will not be honored. If you fail to show up, your grade for that test will be zero and you can drop that grade as per grading policy.

Exam dates are given to you in advance, shall not be changed, and no excuses other than noted shall be accepted.

Students with accommodation must contact the Office of Campus and Community Life (OCCL) at (304) 293-5611 for them to assign accommodations.

Teamwork/professionalism: Although discussions are encouraged, students are forbidden to help or seek help during the exam time allotted, to impersonate another student, and to solicit anyone to work and/or submit any work for anyone, including but not limited to exams, quizzes, and homework.

Computer usage: MATLAB and Excel are used in assignments and may be used in exams.

No partial credit policy: Each problem in homework/exams is setup with partial answers (each in its own answer-box) to allow for “partial credit” to be obtained but “no credit shall be given for incorrect

answers". A scalar valued answer has 3 parts: "sign, magnitude, and units"; all parts must be correct for the answer to count. Moreover, if the answer is part of a vector-valued entity, such as force, etc., then a scalar value answer is a component of a vector and a vector has "direction", thus, the answer must be entered in the correct answer-box for the correct direction. Same applies to tensor-value entities such as stress, strain, etc. If you swap two "supposedly correct answers" and record them in the incorrect box, you get zero for both. Use homework "UNITS" to familiarize with the way units "must be" used. Units are part of the answers. If the unit is wrong, you get zero for that answer.

Grading: If anyone asks me to increase his/her grade because I took off points on something on your paper but did not take as much on someone else's paper, then you must bring to me both exams, yours and your buddy's, so I can regrade BOTH problems in BOTH exams looking for alleged lack of consistent grading.