MEC 363: Mechanics of Solids

The State University of New York Korea – Stony Brook University

Spring 2021

INSTRUCTOR	Dr. Jongseong Brad Choi	jongseong.choi@sunykorea.ac.kr	Academic Building B625
TA	Mark Anthony Rotor	markanthony.roter@stonybrook.edu	C604
LECTURE	TUTH	2:00 – 3:20 pm	online
RECITATION	TU	3:30 – 4:23 pm	online
OFFICE HOURS	TH	3:30 – 5:30 pm, or by appointment	B625

COURSE TEXTBOOK

Mechanics of Materials, Ç F. P. Beer, E. R. Johnston Jr., J. T. DeWolf, and D. F. Mazurek, McGraw-Hill Education, 7 ed.

PREREQUISITE

MEC 260

ASSIGNMENTS

As basic preparation for each lecture, you should read the assigned material before coming to class. In-class discussion and examples are designed to help prepare you for homework assignments. In addition to the reading and homework assignments, you should review your past class notes on a daily basis.

Homework: Individual homework is assigned weekly throughout the semester. They will be given every Thursday. Homework assignment should be scanned and submitted through Blackboard (https://blackboard.stonybrook.edu/) before Thursday at 11:59 pm of the following week. You can drop one worst score at the end of the course. The detailed course schedule is provided in the following pages of '**Course Schedule**'.

EXAMINATION

There are two midterm examinations and one comprehensive final examination. For all examinations, you can bring one sheet (both sides) for equations and notes. You can bring your TI-30X calculator, pencil(s), and eraser. The use of smartphones, laptop, iPad, or any other sources of communication is strictly prohibited. For the grading, point deduction will occur when you do not represent: the engineering approach, free body diagram (FBD), list of assumptions and equations, and sufficient details of the solution. Problem solution format will be provided in detail on the following page.

COURSE GRADING

Homework & Attendance	20%
Midterm #1	20%
Midterm #2	20%
Final Exam	40%
TOTAL	100%

Grading will be curved and normalized to 100% then given in a scale of:

92 ≤	A	< 100	74 ≤	C+	< 78
88 ≤	A-	< 92	70 ≤	C	< 74
85 ≤	B+	< 88	67 ≤	C-	< 70
81 ≤	B	< 85	64 ≤	D+	< 67
78 ≤	B-	< 81	60 ≤	D	< 64

COURSE SCHEDULE

On behalf of Ministry of Education's directive, the University has moved all the classes to 100% online starting this coming Monday, Feb 22, and continue until June 17, 2021. Therefore, the classes are organized as fully online sessions until further guideline is provided by the University. The location of midterm and final exams will be determined based on further guideline coming up. Please find details in the following pages of '**Course Schedule**'. The link for the online classroom will be provided on the Blackboard.

SAFETY GUIDELINE

Everyone participating in any in-person sessions or meetings ***must wear a mask or face covering at all times*** or have the appropriate documentation for medical exemption. Any student not in compliance with this policy will be asked to leave the classroom. If students need to drink or eat, they should step out of the classroom to do so. Please refer to the 'Guidelines for Spring 2021 in COVID-19 Situation' for more information.'

COURSE LEARNING OBJECTIVES	ASSESSMENT TOOL
1. Understand the fundamental definitions of stress, strain, constitutive relations, and equilibrium	Exams/ Homework
2. Know how to analyze the mechanical behavior of real-world structures made up of bars, columns, shells, and beams subjected to axial loading, torsion, hydrostatic pressure, and bending	Exams/ Homework
3. Know how to systematically approach statically indeterminate systems	Exams/ Homework
4. Know how to compute principal stresses and strains	Exams/ Homework
5. Know how to compute principal stresses and strains	Exams/ Homework
6. Understand and know how to utilize Mohr's circle	Exams/ Homework
7. Have the ability to design structures for given applications in a simple and logical manner by employing the concepts of stress, strain, constitutive relations, equilibrium, and stability	Exams/ Homework

COURSE OVERVIEW

Stress and deformation of engineering structures and the influence of the mechanical behavior of materials. Concepts of stress and strain, constitutive relations, analysis of statically indeterminate systems, study of simple bars and beams, and stability conditions. Emphasis on force equilibrium, elastic response of materials, geometric compatibility, Mohr's circle, stresses and deflections in beams, and torsion and buckling of rods. Design for bending, shear and combined states of stress.

COURSE TOPIC
1. Introduction and Concept of Stress
2. Stress and Strain, Axially Loaded Members
3. Torsion
4. Pure Bending
5. Shear Forces and Stresses in Beams
6. Transformation of Stress and Strain
7. Principal Stresses
8. Deflection of Beams
9. Columns, Buckling
10. Energy Method

BLACKBOARD

All homework assignments and solutions will be posted on the Blackboard course account (http://blackboard.stonybrook.edu/). For problems logging in, go to the coordinator of the department. It is your responsibility to make sure that you can access the blackboard system.

ACADEMIC HONESTY

The campus policies on academic honesty are available on the Web (http://naples.cc.sunysb.edu/CAS/ajc.nsf/pages/info). Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work that is not originally yours. Examples include, *but are not limited to*, copying or plagiarizing class assignments including homework, reports, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted. Faculty members are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please

refer to the academic judiciary website: http://www.stonybrook.edu/commcms/academic_integrity/index.html

SPECIAL NOTE ON ADA

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

CRITICAL INCIDENT MANAGEMENT STATEMENT

The State University of New York, Korea expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

ATTENDANCE POLICY of SUNY KOREA

1. All students of SUNY Korea are required to attend every class.
2. Unexcused absences will affect seriously the student's final grade in the course.
3. If a student has over 20% unexcused absence, the student's final course grade will be an 'F'.
4. Students should report the reason of absence to the instructor in advance, or immediately after the absence.
5. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
6. The instructor of the course reserves the right to excuse absences.
7. The course instructor may excuse the absence if the submitted documentation fulfills the conditions below. • Extreme emergencies (e.g. death in the family) • Severe medical reasons with doctor's note (Not a slight illness) • Very important events (e.g. national conference, official school event)
8. At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

PROBLEM SOLUTION FORMAT

For both homework and examination, use empty A4-size paper, only one side and only one problem per page. If more than one page is needed for a problem, all pages must be transmitted in order. At the top of the paper, you write the following information from left:

Your name (first, last)	Student ID number	Problem number (i.e. HW1, HW2, …)	Page number (i.e. 1/3, 2/3, 3/3, …)

Then, provide the information listed below:

Find: List what the problem wants you to find. You use this information to decide on the system you'll be analyzing, and how you'll sketch the appropriate energy flow diagram. This information will also drive your choice of basic equation(s) for problem solution since the one(s) you chose must include the quantity (or quantities) of interest.

Free Body Diagram (FBD): Your Free Body Diagram (FBD) is a diagrammatic representation of a single body or a subsystem of bodies isolated from its surroundings showing all the forces acting on it, visualizing the applied forces, moments, and resulting reactions on a body in a given condition. Your FBD will guide your choice of force or energy direction or equilibrium coherently.

Given: Given information serves three purposes. First, it helps you determine which terms in your basic equations you can settle on immediately. Second, it helps you determine how many basic equations you need—the number of basic equations must equal the number of unknowns. Third, it provides guidance for constructing your EFD.

Assumptions: Assumptions are listed to help you eliminate terms in your basic equations.

Solution: This includes correct units.

Course Schedule
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Lecture	Day	Date	Location	Topic	Chap.	HW given	HW due
1	TU	Feb 23	online	Syllabus; Intro; Basic concept	Ch.1		
2	TH	Feb 25	online	Stress and Strain; Axially Loaded Members	Ch.2	HW #1	
3	TU	Mar 2	online	Stress and Strain; Axially Loaded Members	Ch.2		
4	TH	Mar 4	online	Torsion	Ch.3	HW #2	HW #1
5	TU	Mar 9	online	Torsion	Ch.3		
6	TH	Mar 11	online	Pure Bending	Ch.4	HW #3	HW #2
7	TU	Mar 16	online	Pure Bending	Ch.4		
8	TH	Mar 18	online	Shear Forces and Stresses in Beams	Ch.5	HW #4	HW #3
9	TU	Mar 23	online	Shear Forces and Stresses in Beams	Ch.5		
10	TH	Mar 25	online	Review for Midterm #1	Ch.5		HW #4
11	TU	Mar 30	online	Midterm #1 – No class			
	TH	Apr 1	online	Midterm #1 Review;		HW #5	
12	TU	Apr 6	TBD	Transformation of Stress and Strain	Ch.6		
13	TH	Apr 8	TBD	Transformation of Stress and Strain	Ch.6	HW #6	HW #5
14	TU	Apr 13	TBD	Principal Stresses	Ch.7		
15	TH	Apr 15	TBD	Principal Stresses	Ch.7	HW #7	HW #6
16	TU	Apr 20	TBD	Principal Stresses	Ch.7		
17	TH	Apr 22	TBD	Deflection of Beams	Ch.8	HW #8	HW #7
18	TU	Apr 27	TBD	Deflection of Beams	Ch.8		
19	TH	Apr 29	TBD	Review for Midterm #2		HW #9	HW #8
	TU			Correction day – No class			
	TH			Correction day – No class			
	TU	May 11	TBD	Midterm #2 – No class			HW #9
20	TH	May 13	TBD	Midterm #2 Review		HW #10	
21	TU	May 18	TBD	Columns, Buckling	Ch.9		
22	TH	May 20	TBD	Columns, Buckling	Ch.9	HW #11	HW #10
23	TU	May 25	TBD	Columns, Buckling	Ch.10		
24	TH	May 27	TBD	Energy Method	Ch.10	HW #12	HW #11
25	TU	Jun 1	TBD	Energy Method	Ch.10		
26	TH	Jun 3	TBD	Course Review			HW #12
	TU	Jun 8	TBD	Final Examination			