

Course Numbering	TMA-MEE208E
Year	Second semester 2026
Subject (J)	Mechanics of Materials I
Subject	(IMAC-U)Mechanics of Materials I
Credit(s)	2Credits
Instructor	TOMONAGA OKABE,YUJI ICHIKAWA
Media Class Subjects	
Essential Subjects	○
Language of Instruction	English
Course Objectives and Summary/ Learning Goals (J)	
Course Objectives and Summary/ Learning Goals	The class code for Google Classroom can be found on the Web site of the School of Engineering: https://www.eng.tohoku.ac.jp/edu/syllabus-ug.html (JP Only) 1. Class subject Mechanics of materials is a branch of applied mechanics that deals with the basic behavior of solid bodies subjected to various types of loading. Knowledge of the stress and strain setup within bodies and the resulting deflection is a prerequisite for the structural design of industrial products and infrastructure, such as buildings, roads, bridges, and various equipment. In this course, the basic principles of structural design are presented through the quantitative evaluation of mechanical stress and strain fields in various structures. 2. Object and summary of class This course is intended as an introductory course in the mechanics of solids offered to engineering students. It focuses on developing analysis techniques based on principles for a range of practical problems, including simple structures, pressure vessels, beams, and shafts. 3. Goal of study The goal of this course is to acquire the basic concepts of stress and strain in materials and structures, and the quantitative analytical methods for stress and strain fields in various structures.
Relevance to Other Subjects/Considerations for Taking the Class (J)	
Relevance to Other Subjects/Considerations for Taking the Class	It is assumed that the students have had some experience in elementary statics (mechanics of rigid bodies) and mathematics (such as differentiation and integration).
Course Description (J)	
Course Description	1. Introduction: Highly functional and reliable design of structures 2. Basic concept of stress and strain 3. Mechanical properties of materials 4. Hook's law and strength of materials 5. Two-dimensional stress and strain fields (Pin-jointed structure) 6. Thermal stress and residual stress 7. Thin rings and stress concentration 8. Mid-term exam 1 9. Biaxial stress and strain fields: Normal stress, shear stress 10. Combined stress field: Principal stress and Mohr's circle 11. Combined stress field: Two-dimensional Hooke's law 12. Torsion: Circular shafts 13. Torsion: Stepped bar, power transmission 14. Torsion: Thin-walled tube, rectangular shaft 15. Mid-term exam 2 16. Final exam
Preparation and Review(J)	
Preparation and Review	Homework is assigned at every lecture.
Evaluation methods and criteria (J)	

Evaluation methods and criteria	1. Homework (every lecture): 10% 2. Mid-term exams 1 and 2: 40% (20% each) 3. Final exam: 50%				
Textbooks and references					
Title	Author	Publisher	Year	ISBN/ISSN	Classification
Schaum's Outline of Strength of Materials, Seventh Edition	M.C. Potter and W. Nash	McGraw-Hill	2019	1260456544	Textbook
Elements of Strength of Materials	S. Timoshenko and D. H. Young	Van Nostrand Reinhold Company	1968	0442085478	Reference
An Introduction to the Mechanics of Solids, Second edition	S.H. Crandall, N.C. Dahl, and T.J. Lardner	McGraw-Hill	1999	0070134367	Reference
URL					
Attached File					
Office Hours(J)					
Office Hours					
Contact : Please insert '@' in the email address.	Please use Google Classroom for course-related communication.				
Notes					
Practical Skill/Hands-on Class					
Other Comments/Instructions					
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One-credit courses require 45 hours of study. In lecture and exercise-based classes, one credit consists of 15-30 hours of class time and 30-15 hours of preparation and review outside of class. In laboratory, practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.