Mechanics of Materials II

Course Code: TB14161 / Google Classroom Code: sapssmp

Subject Numbering	TMA-MEE215E
Year	2021
Subject	(IMAC-U)Mechanics of Materials II
Credit(s)	2
Instructor	GO YAMAMOTO TOSHIYUKI HASHIDA

Language	英語
Object in Class subject and Object and summary of class and Goal of study(J)	Google Classroom will be used in this course. Class code is "sapssmp". Please visit Google Classroom and enter the class code.
Object in Class subject and Object and summary of class and Goal of study	1. Class subject Mechanics of Materials utilizes models that drastically simplify the geometry of structures/components to be designed and the loading modes acting on them, while retaining their essential feature. On the basis of the simplified models the fundamental and necessary knowledge of their mechanical responses is derived and provided for the design of the structures/components. This course is intended as an introduction in mechanics of solids offered to engineering students, and presents the underlying theories and formulations for the description of stress/strain and deformations under various types of loading. 2. Object and summary of class Mechanics of Materials II discusses the loading mode of bending in addition to tension/compression and torsion treated in Mechanics of Materials I. In particular, beams subjected to bending moments are extensively analyzed. The topics covered in the course of Mechanics of Materials II includes; (1) theory of beams which allows us to calculate bending/shear stresses in beams and their deflections; (2) energy methods such as Castigliano's theorem; and (3) compression-induced failure such as buckling. 3. Goal of study At the end of the course, students should be able to calculate the stresses and deformation, and to determine the condition of buckling in simple structures/components such as beams and frames.
Other subject is relevant and complete a point to notice(J)	
Other subject is relevant and complete a point to notice	It is assumed that the students studying in this course will have some experience in elementary statics (mechanics of rigid bodies) and mathematics (such as differentiation, integration and differential equations).
Contents and progress schedule of class(J)	
Contents and progress schedule of class	1. Introduction: Design of structures and approach of Mechanics of Materials Bending moment and shear force in beams: Types of supports and loads in beams 2. Bending moment and shear force in beams:Bending moment diagram and shear force diagram 3. Stresses in beams: Bending stress and curvature, geometrical parameters of cross section 4. Stresses in beams: Shear stress, composite beams, and combined bending and torsional loads 5. Deflection of beams: Differential equation of the elastic curve, and end conditions 6. Deflection of beams: Deflections by superposition 7. Deflection of beams: Deflections by shear forces 8. Statically indeterminate beams: Compatibility of deformation, method of superposition 9. Summary and Examination-1 10. Strain energy and energy methods: Formulations of strain energy, Castigliano's theorem 11. Strain energy and energy methods: Application to statically indeterminate beams: 12. Strain energy and energy methods: Maxwell's reciprocal theorem 13. Column: Failure due to axial compression, Buckling, Euler's formula of buckling loads 14. Column: Effects of end conditions on buckling loads, semi-empirical formulas 15. Summary and Examination-2
self study(J)	The session time is limited and therefore self-directed learning is important. Students are required to prepare and review for each class.
self study	The students are requested to study the fundamental items described in the textbook before and after each class, and to elaborate the part(s) designated by the lecturer in the class. Several assignments will be provided in the course, and the students are asked to solve them and hand in their solutions as a report.
Record and evaluation method(J)	
Record and	

evaluation method	1. Assignments: 20% 2. Examinations-1 & 2 (Closed book and no notes): 80% (40% each)

Textbook and references

No	Title	Author	Publisher	Year	ISBN/ISSN	Classification
1.	『"Strength of Materials, Fifth Ed.", Schaum's Outline Serie』	W. Nash and M. Potter	McGraw-Hill	2010	9780071635080	Textbook
2.	『Elements of Strength of Materials』	S. Timoshenko and D. H. Young	Van Nostrand Reinhold Company	1968		Reference
3.	『An Introduction to the Mechanics of Solids. 2nd ed.』	S.H. Crandall, T. J. Lardner, and N. C. Dahl	McGraw-Hill	1999	9780072380415	Reference

URL	
Attached file	
Office hours(J)	
Office hours	The students are welcome to contact the lecturer in order to arrange an meeting for questions.
Notes	
Practical business	NA
In addition	
Last Update	2021/08/23 16:04
	1単位の授業科目は、45時間の学修を必要とする内容をもって構成することを標準としています。1単位の修得に必要となる学修時間の目安は、「講義・演習」については15～30時間の授業および授業時間外学修（予習・復習など）30～15時間、「実験、実習及び実技」については30～45時間の授業および授業時間外学修（予習・復習など）15～0時間です。 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 training, and practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.