

Class Syllabus – Fall Semester, 115 Academic Year

Department of Mechanical Engineering, National Chung Cheng University

Course Name: : Strength of Materials I				Dept.		IBPME
				Course Code		4232302
Instructors	Pai-Chen Lin	Credits	3	Compulsory	Grade	Second-Year
EMI	☒ Yes ☐ No					
Course type	☐ Humanistic Care Course ☒ Problem-oriented Course ☐ Integrate the curriculum ☐ Internship ☐ Competition Special Course ☐ Topic-based courses ☐ Practical courses ☐ Other					
Prerequisites: Statics (靜力學) Class Description: This course is mainly to introduce fundamental contents of solid mechanics, including stress, strain, mechanical properties, axial load, torsional moment, bending moment, shear force, and coordinate transformation. Class Objective: Mechanics of materials is a fundamental course for students who have great interests in analysis and design of solid structures. This course introduces the behaviors of solid bodies subjected to various types of loads for students, including axial-loaded bars, torque-twisted shafts, and bended beams. In addition, this course also introduces the basic concepts of stress and strain, which are the foundation of elasticity.						
Textbooks	Mechanics of Materials , R. C. Hibbeler, 11th edition, Prentice Hall Please respect intellectual property rights and do not illegally photocopy textbooks specified by the instructor.					
An overview of the main points of teaching						
Teaching Materials	☒ PPT ☐ Self-edited textbooks ☒ Self-made instructional videos ☒ Course handouts ☐ Teaching Procedures ☐ Other					
Teaching Methods	☒ Lectures ☐ Oral presentation ☐ Case studies ☐ Group discussion ☐ Problem-oriented learning ☐ Other					
Evaluation Tools	☒ Mid-term Exam ☒ In-class Quiz ☐ Homework ☐ Final Report ☐ Other ☒ Final Exam ☐ In-class homework ☐ Mid-term Report ☐ Special Report ☐ Scales					
Teaching Resources	☒ Course website ☒ Electronic files of textbooks are available for download ☐ Internship website					

Instructor's Information	Pai-Chen Lin Email: imepcl@ccu.edu.tw Room: 532A					
Course Outlines		Teaching Hours				Core Competence
Unit Title	Contents	Lectures	Demo	Practice	Other	
Foundation of Solid Mechanics	1. Stress 2. Strain 3. Stress-strain relationship	9				B1, B3, B5, B6
Solid under loading	1. Axial load 2. Torsion 3. Bending 4. Transverse shear force 5. Pressure vessel	36				B1, B3, B5, B6
Stress Transformation	1. Combined loads 2. Stress Transformation	9				B1, B3, B5, B6
Achievable Core Competence		Achievable Objective				
B1	具備基本工程數學、固體力學、熱流力學、自動控制及材料科學分析的能力 Capable of basic engineering mathematics, solid mechanics, thermodynamics, automatic control and material science analysis	具備基礎工程數學、材料力學分析的能力 Capable of basic engineering mathematics and material mechanics analysis				
B3	具備執行固力實驗、熱流實驗、自動控制實驗、電子學實驗和分析數據的能力 Ability of conducting solid mechanics experiment, thermal fluid experiment, automatic control experiment, electronics experiment and data analysis	具備執行固力實驗及分析數據的能力 Ability of conducting solid mechanics experiments and data analysis				
B5	具備機械系統、元件設計與製程規劃的能力 Capable of mechanical system and component design, and process planning	具備初步設計機械結構及元件的能力 Capable of preliminary design for mechanical structure and component				
B6	具備發掘、分析及解決專業問題的能力 Having ability to discover, analyze and solve professional problems	具備發掘、分析及解決機械結構或元件相關問題的基本能力 Having ability to discover, analyze and solve fundamental problems of mechanical structure or component				

Core competencies of the University Division

B1 Possess the ability of basic engineering mathematics, solid mechanics, heat flow mechanics, automatic control, materials science and opto-mechanical integration engineering practical analysis

B2 Ability to absorb and integrate cross-domain knowledge

- B3 Ability to perform solid force experiments, heat flow experiments, mechanical project implementation, optoelectronic engineering experiments and analyze data
- B4 Ability to write programming languages and computer-aided design
- B5 Mechanical and opto-electromechanical systems, component design and process planning capabilities
- B6 Ability to identify, analyse and solve professional problems
- B7 Ability to implement and innovate
- B8 Ability to engage in scientific writing and presentations
- B9 Ability to work as a team, communicate effectively and manage the program
- B10 Learn general knowledge and demonstrate the ability of engineering ethics, social responsibility and sustainable development

Weekly teaching plan				
Course Time	Course Location	Grading	Office hour	Teaching quality evaluation method
週一 10-12 Monday 10-12	機械 214 右 ME Bldg. Rm. 214 R	作業小考(Quiz) 40% 期中考 (Midterm Exam) 20% (x2) 期末考 (Final Exam) 20%	週二 14:00-16:00 Tuesday 14:00-16:00	Questionnaire
Weeks	Teaching & Homework Progress			Note
1	Introduction, Stress			Ch1
2	Strain			Ch2
3~4	Mechanical Properties of Material			Ch3
5~6	Axial Load			Ch4 (Sec. 4.1~4.7) and Midterm 1
7~8	Torsion			Ch5 (Sec. 5.1~5.5, 5.7, 5.8)
9~11	Bending			Ch6 (Sec. 6.1~ 6.7, 6.9), Midterm 2
12~13	Transverse Shear			Ch7 (Sec. 7.1~ 7.6)
14	Combined Loading			Ch8
15~16	Stress Transformation			Ch9 (Sec. 9.1~9.6)
17	Final Exam			