Class Syllabus – Fall Semester, 115 Academic Year
International Bachelor Degree Program in Mechanical Engineering,
National Chung Cheng University

Course Name:：Applied Mechanics（I）				Dept.		IBPME
				Course Code		4231006
Instructors	**I-Ling Chang**	Credits	3	Compulsory	Grade	First-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:
Equipped with basic concepts of Newtonian mechanics and vectors as well as basic calculus concepts.

Class Description：
Develop mathematical models of mechanics that can be applied to engineering and real-world mechanical problems.

Class Objective：

1. To develop the abilities to analyze the forces on an object and to draw Free-Body Diagrams of the forces on an object.
2. Learn to use coordinate systems to describe the forces and moments of an object.
3. To establish the equilibrium diagrams of forces and moments of an object, and to find the state of forces and moments of an object.
4. Understand the concept of center of gravity and center of mass and determine the moment of inertia of an object.
5. Learn to use virtual work method to analyze the forces on a system.
6. Develop students' abilities to think logically and analyze mechanical systems.
7. Develop students' abilities and independent thinking to analyze mechanical systems.

Textbooks	R.C. Hibbeler , Engineering Mechanics－Statics, 15th ed. (Pearson, 2023) **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 ☐ Group discussion ☐ Oral presentation ☐ Problem-oriented learning ☐ Case studies ☐ Other
Evaluation Tools	■ Mid-term Exam ■ Final Exam ■ In-class Quiz ☐ In-class homework ☐ Homework ☐ Mid-term Report ☐ Final Report ☐ Special Report ☐ Other ☐ Scales
Teaching Resources	■ Course website ☐ Electronic files of textbooks are available for download ☐ Internship website
Instructor's Information	I-Ling Chang, ilchang@mail.ncku.edu.tw

Course Outlines		Teaching Hours				Core Competence
Unit Title	Contents	Lectures	Demo	Practice	Other	
Vectors	1. Cartesian Coordinate 2. Dot product and Cross production	2				B1, B6
Force	1. Force System Resultants 2. Internal Force 3. Friction	10				B1, B5
Equilibrium	1. Equilibrium of a Particle 2. Equilibrium of a Rigid Body	8				B1, B5, B6
Structural	Structural Analysis	4				B1, B5, B6
Moment	Moment of Inertia	4				B1, B5, B6
Geometry	Center of Gravity and Centroid	4				B1, B5, B6
Energy	Virtual Work	4				B1, B5, B6

Achievable Core Competence		Achievable Objective
B1	Possess the ability of basic engineering mathematics, solid mechanics, heat flow mechanics, automatic control, materials science and opto-mechanical integration engineering practical analysis	Possess the ability of basic engineering mathematics, solid mechanics, heat flow mechanics, automatic control, materials science and opto-mechanical integration engineering practical analysis
B5	Mechanical and opto-electromechanical systems, component design and process planning capabilities	Mechanical and opto-electromechanical systems, component design and process planning capabilities
B6	Ability to identify, analyse and solve professional problems	Ability to identify, analyse and solve professional problems

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
Wed 16:10-19:00	Engineering Building II Rm 214B	• 20% for the Quizzes • 2 Mid-term Exams: 50% • 1 Final Exam: 30% (Depending on the actual teaching situation, the instructor reserves the right to adjust the final score, but the final score will not be lower than the above.)	Email for reservation	Questionnaire

Weeks	Teaching & Homework Progress	Note
1	**Introduction**	
2	**General Principles and Force Vector**	
3	**Force System Resultants** ：Force and Moment	QUIZ 1
4	**Force System Resultants** ：Force and Couple	
5	**Equilibrium of a Particle**	QUIZ 2
6	**Equilibrium of a Rigid Body**：Two Dimensions and F.B.D	
7	**Equilibrium of a Rigid Body**：Three Dimensions and F.B.D	Midterm Exam
8	**Structural Analysis**：the method of joints and section	
9	**Structural Analysis**：analyze the force action on the members of system	QUIZ 3

10	**Internal Force**	
11	**Friction**	QUIZ 4
12	**Friction**	
13	**Center of Gravity and Centroid**：Center of gravity, mass and centroid	Midterm Exam
14	**Center of Gravity and Centroid**：for system, the area and volume	
15	**Moment of Inertia**：To establish math module for an area	QUIZ 5
16	**Moment of Inertia**：To find extreme value and discuss the math moment of inertia	
17	**Virtual Work**：Concept and Mathematical model	QUIZ 6
18	**Virtual Work**：Concept and Mathematical model	Final Exam

Course Policies

(1) Course Expectations

Applied Mechanics (I) is a **required core course** and provides an essential foundation for subsequent engineering courses. Students are expected to take the course seriously from the beginning of the semester.

Grades will be assigned according to the announced grading policy and will **not** be adjusted for individual circumstances, including the possibility of failing or being dismissed from a program. Students are responsible for their own academic performance and should be prepared to accept the consequences of their efforts.

(2) Midterm and Final Examinations

No make-up examinations will be offered for the midterm or final exam except in documented emergencies approved in advance by the instructor. Reasons such as oversleeping, forgetting the exam time, or other personal scheduling issues will **not** be accepted.

(3) Attendance

Class attendance is **not mandatory**. However, attendance and participation may be taken into consideration when the instructor determines whether a student whose final grade is close to the passing threshold is eligible for a discretionary grade adjustment.

(4) Leave of Absence and Make-up Examinations

Except in cases of emergency, requests for leave must be submitted **before class** via email to both the instructor and the teaching assistant.

A make-up examination will be arranged **only** for approved absences due to legitimate reasons, and only students with approved leave will be eligible to receive a grade for the make-up examination.

(5) Class Participation Bonus

To encourage active learning and classroom engagement, students who ask thoughtful questions or provide correct answers during class discussions may receive bonus points toward their final course grade. The maximum participation bonus is **5 points**.