

Class Syllabus – Fall Semester, 115 Academic Year

Department of Mechanical Engineering, National Chung Cheng University

Course Name: : Engineering Mathematics (I)				Dept.		IBPME	
				Course Code		4232505	
Instructors	Anurag Dahiya	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: Basic calculus operations. Course overview: Engineering mathematics is the basis and method for deriving engineering physics phenomena into mathematical models. Subjects included differential equations, Laplace transformations, series solutions, and vector and matrix calculations will be taught to cultivate students' ability to have both theory and practice.							
Textbooks	Advanced Engineering mathematics (7th, Edition, Zill & Cullen) 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	Anurag Dahiya is an Assistant Professor in the Department of International Bachelor Degree Program in Mechanical Engineering and a thermofluid specialist with expertise in computational modeling and thermal engineering						

Course Outlines		Teaching Hours				Core Competence
Unit Title	Contents	Lectures	Demo	Practice	Other	
1. Introduction of ODE	Formulation of ODE	2				B1, B5, B6
2. 1st Order ODE	1. Separable Variables 2. Integrating Factor	8				B1, B5, B6
3. Higher-Order Diff.	1. Exact Equations 2. Higher-Order Diff. Eq.	8				B1, B5, B6
4. The Laplace Transform	1. Definition of L-transform 2. Translation Theorems 3. Operational Properties	8				B1, B5, B6
5. Series Solution of Diff. Eq.	1. Power Series 2. Series Solutions of Diff. Eq.	6				B1, B5, B6
Achievable Core Competence		Achievable Objective				
B1	Capable of basic engineering mathematics, solid mechanics, thermodynamics, automatic control and material science analysis	Capable of basic engineering mathematics analysis				
B5	Capable of mechanical system, component design and manufacturing process planning	Capable of deriving engineering physics phenomena into mathematical models				
B6	Ability to discover, analyze and solve professional problems	Ability to discover, analyze and solve mathematical models related to mechanical system				

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 10:10- 13:00	Engineering Building II R214	Homework 10% (Including attendance) Quiz (10%) Mid-term-I 25% Mid-term-II 25% Final Test 30%	Tuesday: 10:10 AM -12:00 PM Thursday: 14:10-16:00 PM Room no. 525 Tel: 2720411 ext. 33317 E-mail:anurag@ccu.edu.tw	Questionnaire
Weeks	Teaching & Homework Progress			Note
1	Introduction of Differential Equations			
2	Separable Variables			
3	Integrating Factor			
4	Exact Equations			
5	2nd Order ODE			
6	Higher-Order Diff. Eq.			
7	Cauchy-Euler Equation			
8	Mid-term (I)			Mid-term (I)
9	Definition of L-transform			
10	Translation Theorems			
11	Reverse Translation Technique			
12	Operational Properties			
13	Mid-term (II)			Mid-term (II)
14	Power Series -1			
15	Power Series -2			
16	Series Solutions of Diff. Eq. -1			
17	Series Solutions of Diff. Eq. -2			
18	Final Exam			