

Tamkang University Academic Year 112, 2nd Semester Course Syllabus

Course Title	ADVANCED ENGINEERING MATHEMATICS	Instructor	HUANG, YU-LIN
Course Class	TEWXM1A MASTER'S PROGRAM, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 1A	Details	<ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	SDG4 Quality education		
Departmental Aim of Education			
<ul style="list-style-type: none"> I. Cultivating students with capabilities of carrying out practical works or academic research related to water resources and environmental engineering. II. Cultivating students with capability of solving problems through researching, planning, and management. III. Cultivating students to become professional engineers with care in environment and professional ethics. IV. Preparing students with the capabilities of engaging in international engineering business, to adapt to globalization and social needs, and to expand their global perspectives. 			
Subject Departmental core competences			
<ul style="list-style-type: none"> A. Mathematical and engineering knowledge needed for water resources and environmental engineering applications.(ratio:30.00) B. Capabilities of planning and conducting experiments, analyzing and explaining experimental data, applying information tool, and collecting and compiling data. (ratio:15.00) C. Logical thinking, analysis, integration, problem-solving skills, engineering planning, design and implementation ability.(ratio:30.00) D. Skill of using professional foreign language and global perspective.(ratio:10.00) E. Capabilities of writing and presenting research report.(ratio:5.00) F. Awareness of the importance of teamwork, working attitude and professional ethics, and to learn continuously.(ratio:10.00) 			
Subject Schoolwide essential virtues			
<ul style="list-style-type: none"> 1. A global perspective. (ratio:10.00) 2. Information literacy. (ratio:20.00) 3. A vision for the future. (ratio:10.00) 			

4. Moral integrity. (ratio:5.00)
5. Independent thinking. (ratio:25.00)
6. A cheerful attitude and healthy lifestyle. (ratio:5.00)
7. A spirit of teamwork and dedication. (ratio:20.00)
8. A sense of aesthetic appreciation. (ratio:5.00)

Course Introduction

Engineering Mathematics is a required foundational course for students in engineering colleges, with the goal of cultivating the mathematical knowledge needed for practical engineering applications. The content of Advanced Engineering Mathematics mainly includes Fourier analysis and partial differential equations. Through studying Fourier transforms, students are guided to solve partial differential equations using numerical methods.

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

- I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.
- II. Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.
- III. Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	Enhancing students' mathematical knowledge and programming skills for engineering applications.	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDEF	12345678	Lecture	Testing, Study Assignments

Course Schedule

Week	Date	Course Contents	Note
1	113/02/19~ 113/02/25	Introduction and Basics concepts	
2	113/02/26~ 113/03/03	Fourier Series	

3	113/03/04 ~ 113/03/10	Fourier Series	
4	113/03/11 ~ 113/03/17	Sturm-Liouville Problems	
5	113/03/18 ~ 113/03/24	Sturm-Liouville Problems	
6	113/03/25 ~ 113/03/31	Fourier Cosine and Sine Transform	
7	113/04/01 ~ 113/04/07	Fourier Transform	
8	113/04/08 ~ 113/04/14	Chebyshev Series and the FFT	
9	113/04/15 ~ 113/04/21	Midterm	
10	113/04/22 ~ 113/04/28	Basic Concepts of PDEs	
11	113/04/29 ~ 113/05/05	D'Alembert's Solution of the Wave Equation	
12	113/05/06 ~ 113/05/12	D'Alembert's Solution of the Wave Equation	
13	113/05/13 ~ 113/05/19	Heat Equation	
14	113/05/20 ~ 113/05/26	Heat Equation	
15	113/05/27 ~ 113/06/02	Laplace Equation	
16	113/06/03 ~ 113/06/09	Laplace Equation	
17	113/06/10 ~ 113/06/16	Final	
18	113/06/17 ~ 113/06/23	Discussion	
Key capabilities	self-directed learning Problem solving		
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)		
Distinctive teaching			
Course Content	Computer programming or Computer language (students have hands-on experience in related projects) Logical Thinking		

Requirement	
Textbooks and Teaching Materials	Using teaching materials from other writers:Textbooks
References	Kreyszig, E., Kreyszig, H., Norminton, E. J. (2011). Advanced Engineering Mathematics. Hoboken, NJ: Wiley. ISBN: 0470458364 Moin P. Fundamentals of Engineering Numerical Analysis. 2nd ed. Cambridge: Cambridge University Press; 2010. doi:10.1017/CBO9780511781438
Grading Policy	◆ Attendance : % ◆ Mark of Usual : 40.0 % ◆ Midterm Exam : 30.0 % ◆ Final Exam : 30.0 % ◆ Other () : %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . ※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.