Tamkang University Academic Year 114, 1st 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	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education		

Departmental Aim of Education

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

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

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 Vector calculus, Fourier analysis and partial differential equations. Through studying Vector calculus and Fourier transforms, students are guided to solve partial differential equations by using analytical 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 abilities.	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	114/09/15 ~ 114/09/21	Introduction	
2	114/09/22 ~ 114/09/28	Introduction to Vector Calculus	

3	114/09/29 ~ 114/10/05	Gradient, Divergence and Curl	
4	114/10/06 ~ 114/10/12	Integration of Vector Functions	
5	114/10/13 ~ 114/10/19	Integration of Vector Functions	
6	114/10/20 ~ 114/10/26	Laplace Equation and Poisson Equation	
7	114/10/27 ~ 114/11/02	Heat Equation	
8	114/11/03 ~ 114/11/09	Heat Equation	
9	114/11/10 ~ 114/11/16	Midterm Exam	
10	114/11/17 ~ 114/11/23	Wave Equation	
11	114/11/24 ~ 114/11/30	Fourier Series	
12	114/12/01 ~ 114/12/07	Fourier Series	
13	114/12/08 ~ 114/12/14	Sturm-Liouville Problems	
14	114/12/15 ~ 114/12/21	Sturm-Liouville Problems	
15	114/12/22 ~ 114/12/28	Fourier Cosine and Sine Transform	
16	114/12/29 ~ 115/01/04	Fourier Cosine and Sine Transform	
17	115/01/05 ~ 115/01/11	Final Exam	
18	115/01/12 ~ 115/01/18	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	Logical Thinking

Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks, Handouts
References	Kreyszig, Erwin. (1983). Advanced engineering mathematics. New York :Wiley,
Grading Policy	◆ Attendance： 10.0 % ◆ Mark of Usual： % ◆ Midterm Exam： 30.0 % ◆ Final Exam： 30.0 % ◆ Other〈Homework〉：30.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at https://web2.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. ※"Adhere to the concept of intellectual property rights" and "Do not illegally photocopy, download, or distribute." Using original textbooks is advised. It is a crime to improperly photocopy others' publications.