Tamkang University Academic Year 111, 2nd Semester Course Syllabus

Course Title	ENGINEERING MATHEMATICS	Instructor	CHEN, YI-RU
Course Class	TEWAB2A DIVISION OF WATER RESOURCES ENGINEERING, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 2A	Details	◆ General Course ◆ Required ◆ 2nd Semester
Relevance to SDGs	SDG4 Quality education		

Departmental Aim of Education

Ⅰ. Educating students with the fundamental knowledge of mathematics, science and engineering to enable them to succeed in the practice or academic research related to water resources and environmental engineering.

  1. Training students with engineering basics to equip them with the capabilities of construction supervision and operation management.

  2. Cultivating students with ability of applying engineering theory and pursuing innovation to equip them with the capabilities of researching, planning, engineering design, integration and assessment.

  3. Training students with capacity to apply information technology in the engineering business.

Ⅱ. Cultivating students to become professional engineers with care in environment and professional ethics.

  1. Cultivating students with characters of respecting the nature and humane care.

  2. Cultivating students with engineering ethics and law-abiding character.

  3. Preparing students with the capabilities of exploring, analyzing, interpreting, and dealing with problems.

Ⅲ. Preparing students with the capabilities of engaging in domestic and international engineering business.

  1. Cultivating students with the capabilities of project management, presentation and communication skills, and teamwork.

  2. Preparing students with the capabilities of applying professional foreign language and expanding their global perspective.

  3. Cultivating students with cognitive and habits of continuous learning.

Subject Departmental core competences

A. Basic mathematical and engineering knowledge needed for water resources and environmental engineering applications.(ratio:40.00)

B. Capabilities of Engineering drawings, measurement, design, construction, and application of information related tools.(ratio:5.00)

C. Capabilities of logical thinking, analysis, integration, problem-solving skills, innovative design and engineering implementation.(ratio:40.00)

D. Continuous learning of the up-to-date knowledge of professional engineering, professional foreign language skills and global perspective.(ratio:5.00)

E. Awareness of the importance of teamwork and working attitude, and with cognition of professional ethics.(ratio:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:15.00)

2. Information literacy. (ratio:15.00)

3. A vision for the future. (ratio:15.00)

4. Moral integrity. (ratio:5.00)

5. Independent thinking. (ratio:20.00)

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	This course provides students basic engineering mathematical knowledge and how to apply basic mathematics to solve engineering problems. Contents include vectors, vetor calculus, matrices, systems of linear differential equations and nonlinear differential equations

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	Students should recognize that mathematics rests on relatively few basic concepts and involves powerful unifying principles	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment				
No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDE	12345678	Lecture	Testing, Discussion(including classroom and online), Activity Participation

Course Schedule

Week	Date	Course Contents	Note
1	112/02/13 ~ 112/02/19	Introduction to the course, class rules	
2	112/02/20 ~ 112/02/26	Vectors: 2D and 3D	
3	112/02/27 ~ 112/03/05	Vectors: dot product and corss product; Quiz 1	
4	112/03/06 ~ 112/03/12	Vetor calculus: vector functions and curvature	
5	112/03/13 ~ 112/03/19	Vetor calculus: partial derivatives, directional derivative	
6	112/03/20 ~ 112/03/26	Vetor calculus; Quiz 2	
7	112/03/27 ~ 112/04/02	Matrix algebra, determinant	
8	112/04/03 ~ 112/04/09	Public holiday	
9	112/04/10 ~ 112/04/16	Inverse of a matrix, Cramer's rule	
10	112/04/17 ~ 112/04/23	Midterm Exam Week	
11	112/04/24 ~ 112/04/30	Eigenvalue and eigenvector	
12	112/05/01 ~ 112/05/07	System of linear differential equations	
13	112/05/08 ~ 112/05/14	System of linear differential equations	
14	112/05/15 ~ 112/05/21	System of linear differential equations	
15	112/05/22 ~ 112/05/28	System of nonlinear differential equations	
16	112/05/29 ~ 112/06/04	System of nonlinear differential equations	
17	112/06/05 ~ 112/06/11	System of nonlinear differential equations	
18	112/06/12 ~ 112/06/18	Final Exam Week	

Requirement	
Teaching Facility	Computer, Projector, Other (blackboard/white board)
Textbooks and Teaching Materials	Advanced Engineering Mathematics, 7th edition, Dennis Zill
References	
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： ％ ◆ Mark of Usual： ％ ◆ Midterm Exam： 30.0 ％ ◆ Final Exam： 30.0 ％ ◆ Other〈worksheet, quiz〉：40.0 ％
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.**