Tamkang University Academic Year 110, 2nd Semester Course Syllabus

Course Title	ENGINEERING APPLICATION OF COMPUTERS	Instructor	CHEN, YI-RU
Course Class	TEWBB3A DIVISION OF ENVIRONMENTAL ENGINEERING, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 3A	Details	◆ General Course ◆ Required ◆ One 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)

C. Capabilities of logical thinking, analysis, integration, problem-solving skills, innovative design and engineering implementation.(ratio:60.00)

Subject Schoolwide essential virtues
2. Information literacy. (ratio:60.00) 3. A vision for the future. (ratio:20.00) 5. Independent thinking. (ratio:20.00)

Course Introduction	Numerical methods are techniques by which mathematical problems are formulated so that they can be solved with arithmetic operations. This course is designed to help students to recognize the difference between analytical and numerical solutions, and to delineate the rules that underlie structed programming.

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 are able to recognize the difference between analytical and numerical solutions, the difference between truncation and round-off errors, and to be able to solve ordinary differential equations using numerical methods.	Cognitive

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	AC	235	Lecture	Testing, Study Assignments

Course Schedule

Week	Date	Course Contents	Note
1	111/02/21 ~ 111/02/25	Introduction to numerical methods	

2	111/02/28 ~ 111/03/04	Programming and software	
3	111/03/07 ~ 111/03/11	Excel and MATLAB	
4	111/03/14 ~ 111/03/18	Approximations and round-off errors	
5	111/03/21 ~ 111/03/25	Approximations and round-off errors	
6	111/03/28 ~ 111/04/01	Solution of linear system equations	
7	111/04/04 ~ 111/04/08	Solution of linear system equations	
8	111/04/11 ~ 111/04/15	Solution of liner system equations with MATLAB	
9	111/04/18 ~ 111/04/22	Solution of liner system equations with MATLAB	
10	111/04/25 ~ 111/04/29	Midterm Exam Week	
11	111/05/02 ~ 111/05/06	Bracketing and open methods	
12	111/05/09 ~ 111/05/13	Roots of equations	
13	111/05/16 ~ 111/05/20	Ordinary differential equation (ODE)	
14	111/05/23 ~ 111/05/27	Numerical method for solving ODE	
15	111/05/30 ~ 111/06/03	Numerical method for solving ODE	
16	111/06/06 ~ 111/06/10	Numerical Method for Solving ODE with MATLAB	
17	111/06/13 ~ 111/06/17	Numerical Method for Solving ODE with MATLAB	
18	111/06/20 ~ 111/06/24	Final Exam Week	

Requirement	This course will be taught in English.
Teaching Facility	Computer, Projector
Textbooks and Teaching Materials	Numerical methods for Engineers by Steven Chapra and Raymond Canale 7th edition
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〈Assignments, quizs〉：40.0 %
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