Tamkang University Academic Year 104, 1st Semester Course Syllabus

Course Title	ENGINEERING MATHEMATICS	Instructor	TYAN FENG
Course Class	TENXB2B DEPARTMENT OF AEROSPACE ENGINEERING, 2B	Details	◆ Required ◆ 1st Semester ◆ 3 Credits

Departmental Aim of Education

Ⅰ. Apply scientific knowledge and engineering techniques to analyze and solve fundamental aerospace engineering problem.

Ⅱ. Through fundamental theory to design and implement experiments, and be able to analyze experimental data.

Ⅲ. Maintain the spirit of independent thinking, self-elevate, and continuous learning.

Ⅳ. Uphold the responsible attitude of work ethics and team work.

Ⅴ. Will have access to information, using basic knowledge, diversification, and better ability to adapt to circumstances.

Departmental core competences

A. With basic aerospace engineering expertise.

B. Able to solve basic engineering problems via fundamental theory.

C. Capable of lifelong learning and research capacity for further studies.

D. To work with a sense of mission and responsibility.

E. Have team spirit and the ability to communicate with each other.

F. With an international perspective, have the ability to connect with the world.

G. Taking full advantage of information and utilization of computer-assisted problem solving skills.

Course Introduction	This course provides an introduction to ordinary differential equations and their applications. Upon completion of this course the student will: 1. be able to solve a variety of ordinary differential equations, 2. appreciate the theory underlying the techniques of solution, 3. be conversant with methods of applying ordinary differential equations in various applications. Computer programming will be applied to this course so that students knows how to make use of the computer technology as well as linear algebra to solve for engineering problems.

The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I.Objective Levels (select applicable ones) :

(i) Cognitive Domain : C1-Remembering, C2-Understanding, C3-Applying, C4-Analyzing, C5-Evaluating, C6-Creating

(ii) Psychomotor Domain : P1-Imitation, P2-Mechanism, P3-Independent Operation, P4-Linked Operation, P5-Automation, P6-Origination

(iii) Affective Domain : A1-Receiving, A2-Responding, A3-Valuing, A4-Organizing, A5-Charaterizing, A6-Implementing

II.The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :

(i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.

(ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3,C5,and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)

(iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A,AD, and BEF, list all of the three in the box.)

No.	Teaching Objectives	Relevance	
		Objective Levels	Departmental core competences
1	Have students understand the meaning and the techniques of differential equations	C3	ABCDEFG
2	understand how to solve the differential equations by using power series and Laplace transformation	C3	ABCDEFG
3	understand how to use computer to solve linear problems in engineering	P3	ABCDEFG
4	develop the ability of analyzing engineering problems with mathematics	P3	ABCDEFG
5	Have students understand the meaning and the techniques of differential equations.	C3	ABCDEFG

Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	Have students understand the meaning and the techniques of differential equations	Lecture, Discussion, Problem solving	Written test, homework
2	understand how to solve the differential equations by using power series and Laplace transformation	Lecture, Discussion, Problem solving	Written test, homework
3	understand how to use computer to solve linear problems in engineering	Lecture, Discussion, Problem solving	Written test, homework

4	develop the ability of analyzing engineering problems with mathematics	Lecture, Discussion, Problem solving	Written test, homework
5	Have students understand the meaning and the techniques of differential equations.	Lecture, Problem solving	Written test

This course has been designed to cultivate the following essential qualities in TKU students

Essential Qualities of TKU Students	Description
◇ A global perspective	Helping students develop a broader perspective from which to understand international affairs and global development.
◆ Information literacy	Becoming adept at using information technology and learning the proper way to process information.
◇ A vision for the future	Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision.
◇ Moral integrity	Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems.
◆ Independent thinking	Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically.
◇ A cheerful attitude and healthy lifestyle	Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life.
◇ A spirit of teamwork and dedication	Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems.
◆ A sense of aesthetic appreciation	Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process.

Course Schedule

Week	Date	Subject/Topics	Note
1	104/09/14 ~ 104/09/20	Introduction to Differential Equations	
2	104/09/21 ~ 104/09/27	Equations of First Order	
3	104/09/28 ~ 104/10/04	Equations of First Order	
4	104/10/05 ~ 104/10/11	Linear Differential Equations	
5	104/10/12 ~ 104/10/18	Linear Differential Equations	
6	104/10/19 ~ 104/10/25	Linear Differential Equations	
7	104/10/26 ~ 104/11/01	Power Series Solutions	
8	104/11/02 ~ 104/11/08	Power Series Solutions	

9	104/11/09～ 104/11/15	Power Series Solutions	
10	104/11/16～ 104/11/22	Midterm Exam Week	
11	104/11/23～ 104/11/29	Laplace Transform	
12	104/11/30～ 104/12/06	Laplace Transform	
13	104/12/07～ 104/12/13	Nonlinear Differential Equations	
14	104/12/14～ 104/12/20	Nonlinear Differential Equations	
15	104/12/21～ 104/12/27	Fourier Series, Fourier Integral and Fourier Transform	
16	104/12/28～ 105/01/03	Fourier Series, Fourier Integral and Fourier Transform	
17	105/01/04～ 105/01/10	Fourier Series, Fourier Integral and Fourier Transform	
18	105/01/11～ 105/01/17	Final Exam Week	

Requirement	Work hard.
Teaching Facility	Computer, Projector
Textbook(s)	T.B.D.
Reference(s)	William E. Boyce, Richard C. DiPrima Boyce, "Elementary Differential Equatinos," 8th ed, Wiley, 2004 C.R. Wylie, "Advanced Engineering Mathematics," 6thed, 1995
Number of Assignment(s)	8 (Filled in by assignment instructor only)
Grading Policy	◆ Attendance： % ◆ Mark of Usual：35.0 % ◆ Midterm Exam： 50.0 % ◆ Final Exam： 15.0 % ◆ 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.**