Tamkang University Academic Year 101 , 2 Semester

Course Syllabus

<table>
<tr><td>Course Title</td><td colspan="2">ADVANCED MATHEMATICAL PHYSICS</td><td>Instructor</td><td>Choon-Lin Ho</td></tr>
<tr><td colspan="2">Department/Year/Class</td><td colspan="3">Course Details</td></tr>
<tr><td colspan="2">TSPXD1A</td><td>■Required
□Selective</td><td>■0（One Semester）
□1（1st Semester）
□2（2nd Semester）
□3（3rd Semester）</td><td>Credits 3</td></tr>
<tr><td colspan="2">Aim of Education</td><td colspan="3">Core Competences</td></tr>
<tr><td colspan="2">1.Conveying professional knowledge: Teach the students to learn the core knowledge of physics, to obtain the basic skills needed for physics research, and to apply the professional knowledge to physics related technologies.
2.Analyzing and solving problems: Guide the students to analyze problems, and to acquire the mathematical ability to quantify conceptual models and also the capability needed to think and to innovate in solving various scientific and engineering problems.
3.Training for experimental techniques: Teach the students on how to carry out and to verify various experiments, and at the same time to have the mentality of working cautiously and the awareness in operating safely.
4.Expressing personal characteristics: Help the students to use their personal characteristics, like resolution, sincerity, and concentration, plus their professional skills to gain recognition among the executives and their peers.
5.Cultivating team spirit: Train the students to have the organizational ability and the communicational skills to let them have the adaptability to integrate into a professional team, and to obtain the ability to bring out and to put to use the strength of the team to solve professional problems.
6.Building international views: Comply to the trends of globalization to build an international learning environment and opportunties in order to educate the students to continue in their self-advancements, to absorb new worldwide knowledge, and to become a professional with international views in their future perspective careers.</td><td colspan="3">A.To acquire the core basic knowledge in the field of physics.
B.To understand the overall features of specific fields of physics.
C.To obtain the mathematical ability to quantify concepts, models, and practical problems.
D.To cultivate the basic ability to discover, to analyze, and to solve problems.
E.To practice the actual handling of physics problems, and to have the ability to analyze and to interpret experimental data.
F.To have the mentality to work cautiously and the awareness to operate safely.
G.To comprehend the trend of technological development and to acquire the knowledge and skills of other fields needed in their professional career.
H.To have the spirit and capability in team cooperation.</td></tr>
<tr><td>Course Introduction (50 to 100 words)</td><td colspan="4">This course introduces the basic principles and applications of the theory of differential equations and integral transforms</td></tr>
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The Relevance among Teaching Objectives, Objective Levels and 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 Core Competences：

(I)Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objectives. 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 core competences that correspond to each teaching objective. Each objective may correspond to one or more core competences at a time. (For example, if one objective corresponds to three core competences: A, AD, and BEF, list all of the three in the box.)

Teaching objectives	**Relevance**	
	Objective Levels	**Core Competences**
1. Understand the basic theory of differential equations	C2	ABCD
2. Understand the main methods of solution of differential equations	C2	ABCD
3. Understand the mathematical principles and applications of integral transformations	C2	ABCD
4		
5		
6		
7		
8		

Teaching Objectives, Teaching Methods and Assessment

Teaching Objectives	Teaching Methods	Assessment
1. Understand the basic theory of differential equations	Class-room instruction	Examinations
2. Understand the main methods of solution of differential equations	Class-room instruction	Examinations

3. Understand the mathematical principles and applications of integral transformations	Class-room instruction	Examinations
4		
5		
6		
7		
8		

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

Essential Qualities of TKU Students	Description
□global perspectives	翻譯建構中
□a vision for the future	
□information literacy	
□ethical and moral principles	
□independent thinking	
□an awareness of healthy living	
□effective teamwork	
□an appreciation of the arts	

Course Schedule

Week	Date	Subject/Topics	Note
1		Ordinary differential equations	
2		---- ditto ----	
3		---- ditto ----	
4		Partial differential equations	
5		---- ditto ----	
6		---- ditto ----	
7		---- ditto ----	
8		Power series solutions	
9		---- ditto ----	
10		Midterm Exam Week	
11		Fourier transforms	
12		---- ditto ----	
13		Laplace transforms	
14		---- ditto ----	
15		Sturm-Liouville theory	
16		---- ditto ----	
17		---- ditto ----	
18		Final Exam Week	

Requirement	
Teaching Facility	☐Computer ☐Overhead Projector ■Other（ Black board ）
Textbook(s)	G.B. Arfken and H.J. Weber, Mathematical Methods For Physicists, 6th ed., Academic Press, 2005.
Suggested Readings	
Number of Assignment(s)	(Filled in only for those courses that apply)
Grading Policy	Mid-term exam: 50%, Final exam: 50%
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/index.asp. **※Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**

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