Tamkang University Academic Year 101, 2nd Semester

Course Syllabus

<table>
<tr><td>Course Title</td><td colspan="2">Special Topics in Advanced Analytical Chemistry</td><td>Instructor</td><td>Chih-Hsin, Chen</td></tr>
<tr><td colspan="2">Department/Year/Class</td><td colspan="3">Course Details</td></tr>
<tr><td colspan="2">Department of Chemistry
/Ph.D program</td><td>☐Required
■Selective</td><td>■0（One Semester）
☐1（1st Semester）
☐2（2nd Semester）
☐3（3rd Semester）</td><td>Credits</td><td>3</td></tr>
<tr><td colspan="3">Aim of Education</td><td colspan="3">Core Competences</td></tr>
<tr><td colspan="3">（請填入系(所)教育目標英文翻譯）</td><td colspan="3">（請填入系(所)核心能力英文翻譯）</td></tr>
<tr><td>Course Introduction (50 to 100 words)</td><td colspan="5">Molecular absorption and fluorescence are wildly used as analytical tools to specify and determine the concentrations of various chemical species. They have many applications in our daily life such as disease diagnosis, food science and safety, as well as forensics and counterfeit detection. The object of this course is to allow students to learn the broad principles, techniques and applications of molecular absorption and fluorescence. Besides, as this course is designed to provide students with the ability to communicate and exchange their ideas by using oral English. A short presentation and discussion for assigned topics is required for every student.</td></tr>
<tr><td colspan="6">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.)</td></tr>
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Teaching objectives	Relevance	
	Objective Levels	Core Competences
1. To learn the basic principles of molecular absorption and fluorescence.		
2. To understand the fundamental phenomena and basic techniques of molecular absorption and fluorescence.		
3. To know the applications of molecular absorption and fluorescence on the sensing of chemical species.		
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Teaching Objectives, Teaching Methods and Assessment

Teaching Objectives	Teaching Methods	Assessment
1. To learn the basic principles of molecular absorption and fluorescence.	Explanation, discussion and problem solving.	Writing tests, oral presentation and class performance.
2. To understand the fundamental phenomena and basic techniques of molecular absorption and fluorescence.	Explanation, discussion and problem solving.	Writing tests, oral presentation and class performance.
3. To know the applications of molecular absorption and fluorescence on the sensing of chemical species.	Explanation, discussion and problem solving.	Writing tests, oral presentation and class performance.
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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		Introduction to molecular absorption and fluorescence	
2		Absorption of ultraviolet, visible, and near-infrared radiation	
3		Characteristics for molecular absorption and fluorescence emission	
4		Structural effects on molecular absorption and fluorescence emission	
5		Environmental effects on molecular absorption and fluorescence emission	
6		Steady-state spectrofluorometry	
7		Time-resolved fluorescence techniques	
8		Fluorescence microscopy	
9		Fluorescence correlation spectroscopy	
10		Midterm Exam Week	
11		Evaluation of local physical parameters by means of fluorescence probes	
12		Chemical sensing via molecular absorption and fluorescence	
13		Chemical sensing via molecular absorption and fluorescence	
14		Autofluorescence and fluorescence labeling in biology and medicine	
15		Miscellaneous applications	
16		Oral presentations	
17		Oral presentations	
18		Final Exam Week	
Requirement	Using English to communicate and discuss in class is required.		
Teaching Facility	■Computer ■Overhead Projector ■Other（Black board）		
Textbook(s)	Molecular fluorescence: principles and applications / Bernard Valeur and Mário Nuno Berberan-Santos. Second Edition. Wiley-VCH, 2012.		
Suggested Readings	To be announced.		
Number of Assignment(s)	One oral presentation (Filled in only for those courses that apply)		
Grading Policy	Attendance: 10%; Class performance: 30%; Oral presentation: 30%; Final exam: 30%		
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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