

Tamkang University Academic Year 113, 2nd Semester Course Syllabus

Course Title	INSTRUMENTAL ANALYSIS	Instructor	CHIA-CHI HUANG
Course Class	TSCXB3A DEPARTMENT OF CHEMISTRY, 3A	Details	◆ General Course ◆ Required ◆ 2nd Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education SDG5 Gender equality		
D e p a r t m e n t a l A i m o f E d u c a t i o n			
I . Cultivate the basic professional knowledge and experimental techniques. II . Cultivate the capacity of practical implementation. III . Cultivate professional ethics and lifelong learning.			
S u b j e c t D e p a r t m e n t a l c o r e c o m p e t e n c e s			
A. Possess basic scientific knowledge such as mathematics and physics, and apply them to related fields in chemistry.(ratio:10.00) B. Possess basic knowledge in chemistry such as organic, physical, inorganic, and instrumental analysis, and extend them into biochemistry, material chemistry, and related chemistry. (ratio:50.00) C. Possess basic experimental chemistry techniques and apply them to other chemistry-related experimental works.(ratio:10.00) D. Possess collecting and analyzing chemistry-related information and apply them to basic research ability and seminar participation.(ratio:20.00) E. Possess the professional ethics in chemistry workplace and apply them to solve chemistry problem.(ratio:10.00)			
S u b j e c t S c h o o l w i d e e s s e n t i a l v i r t u e s			
1. A global perspective. (ratio:5.00) 2. Information literacy. (ratio:20.00) 3. A vision for the future. (ratio:20.00) 4. Moral integrity. (ratio:5.00) 5. Independent thinking. (ratio:30.00) 6. A cheerful attitude and healthy lifestyle. (ratio:5.00)			

7. A spirit of teamwork and dedication. (ratio:10.00)				
8. A sense of aesthetic appreciation. (ratio:5.00)				
Course Introduction	This course focuses on modern Instrumental analysis of separation and spectroscopy. For the spring semester 2025, we will learn the principles and practices of separation methods, and their applications in molecular spectroscopy & AI.			
<p>The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.</p> <p>Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.</p> <p>I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.</p> <p>II.Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.</p> <p>III.Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.</p>				
No.	Teaching Objectives			objective methods
1	After completing this course, students are expected to understand the sciences behind current separation technology, the analysis of molecular spectroscopy, and their combination in applications. This course also prepares students for the future applications of modern instrumental analyses in their work or research.			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, Report(including oral and written), Activity Participation
Course Schedule				
Week	Date	Course Contents		Note
1	114/02/17 ~ 114/02/23	Introduction		

2	114/02/24 ~ 114/03/02	Special Topic: AI Coupled with Mass Spectrometry for Immunotherapy Diagnostic Test Development	
3	114/03/03 ~ 114/03/09	Special Topic: Using AI To Speed Up NMR-Based Protein Structure Determination	
4	114/03/10 ~ 114/03/16	Particle Size Determination	
5	114/03/17 ~ 114/03/23	An introduction to chromatographic separation	
6	114/03/24 ~ 114/03/30	An introduction to chromatographic separation	
7	114/03/31 ~ 114/04/06	Teaching administration observation period	Holidays
8	114/04/07 ~ 114/04/13	An introduction to chromatographic separation	
9	114/04/14 ~ 114/04/20	Midterm Exam: Mass, NMR, Particle Size Determination, and Chromatographic separation	
10	114/04/21 ~ 114/04/27	Gas chromatography (GC)	
11	114/04/28 ~ 114/05/04	Gas chromatography (GC)	
12	114/05/05 ~ 114/05/11	High-performance liquid chromatography (HPLC)	
13	114/05/12 ~ 114/05/18	High-performance liquid chromatography (HPLC)	
14	114/05/19 ~ 114/05/25	Supercritical fluid chromatography and extraction (SFC and SFE)	Homework
15	114/05/26 ~ 114/06/01	Electrochromatography (EC)	
16	114/06/02 ~ 114/06/08	Electroanalytical chemistry (CE)	
17	114/06/09 ~ 114/06/15	Final Exam: GC, HPLC, SFC, EC, and CE	
18	114/06/16 ~ 114/06/22	Our Virtual Classroom: 1. AI in Chemistry and Patent Law: Current and Future Issues. 2. AI Tools for Materials Research and Nanotechnology	
Key capabilities		self-directed learning Information Technology	
Interdisciplinary		STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)	

Distinctive teaching	Special/Problem-Based(PBL) Courses AI, CHEMISTRY
Course Content	Logical Thinking AI application
Requirement	There will be no quizzes in this course. Homework will be announced in the iClass system, with at least one-month leeway before it's due. The time is more than enough for you to work. Please take responsibility for your homework and turn in your answers to each question before the deadline, and make sure your answers are uploaded in the correct layer of iClass. As an adult and to be fair to every student, no one will be given a second chance after the deadline.
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks Name of teaching materials: Principles of Instrumental Analysis, Seventh Edition Using teaching materials from other writers:Journals
References	
Grading Policy	<p>◆ Attendance : 30.0 % ◆ Mark of Usual : % ◆ Midterm Exam : 30.0 %</p> <p>◆ Final Exam : 30.0 %</p> <p>◆ Other 〈HOMEWORK〉 : 10.0 %</p>
Note	<p>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.</p> <p>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</p>