

Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	PHYSICAL CHEMISTRY	Instructor	LIAO, SHU-CHUAN
Course Class	TEDXB2B DEPARTMENT OF CHEMICAL AND MATERIALS ENGINEERING, 2B	Details	◆ General Course ◆ Required ◆ 1st Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education SDG8 Decent work and economic growth		
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			
Education Objectives: Cultivation of chemical/materials engineering experts possessing professional knowledge, skills, and literacy.			
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. Qualified basic and core knowledge of chemical/materials engineering.(ratio:50.00) B. Qualified capabilities to conduct chemical/materials engineering experiments and analyze experiment results.(ratio:5.00) C. Qualified capabilities to use the techniques and tools for solving chemical/materials engineering problems.(ratio:20.00) D. Qualified capability to analyze and design the components, processes, and systems of chemical/materials engineering.(ratio:5.00) E. Qualified capability to manage and integrate cross-field projects and to communicate and cooperate with team members.(ratio:5.00) F. Qualified capability to explore, analyze, and handle engineering problems while considering sustainable development.(ratio:5.00) G. Comprehend contemporary issues and understand the interplay between chemical/materials engineering technologies, environmental sustainability, and societal cultural well-being, and develop the capability and habits of lifelong learning.(ratio:5.00) H. Understand professional information ethics and social responsibility for chemical/materials engineers.(ratio:5.00)			
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:15.00)			

4. Moral integrity. (ratio:15.00)				
5. Independent thinking. (ratio:30.00)				
6. A cheerful attitude and healthy lifestyle. (ratio:5.00)				
7. A spirit of teamwork and dedication. (ratio:5.00)				
8. A sense of aesthetic appreciation. (ratio:5.00)				
Course Introduction		This course leverages theories and laws from physics, chemistry, and engineering mathematics to study changes in chemical systems' physical and chemical processes. It covers gas properties, solution properties, fundamental thermodynamic laws, phase transitions, mixtures, and chemical equilibrium. Emphasizing conceptual understanding and computational skills, the course explores qualitative and quantitative aspects of these changes, providing a solid foundation for learning and applying physical chemistry theories.		
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	Understand the properties of gases, the first and second laws of thermodynamics, phase transitions, mixtures, and chemical equilibrium.			Cognitive
The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment				
No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDEFGH	12345678	Lecture, Discussion, Experience	Testing, Study Assignments, Discussion(including classroom and online)
Course Schedule				
Week	Date	Course Contents		Note

1	114/09/15 ~ 114/09/21	Introduction to physical chemistry	
2	114/09/22 ~ 114/09/28	The properties of gases: the perfect gas	
3	114/09/29 ~ 114/10/05	The properties of gases: the real gas	
4	114/10/06 ~ 114/10/12	The kinetic model	
5	114/10/13 ~ 114/10/19	Brief discussion on the first law of thermodynamics	
6	114/10/20 ~ 114/10/26	Internal energy, work, heat and enthalpy	
7	114/10/27 ~ 114/11/02	State function and exact differentials	
8	114/11/03 ~ 114/11/09	Adiabatic changes	
9	114/11/10 ~ 114/11/16	期中考/期中評量週(老師得自行調整週次)	
10	114/11/17 ~ 114/11/23	Entropy and the second law of thermodynamics	
11	114/11/24 ~ 114/11/30	Entropy changes accompanying specific processes	
12	114/12/01 ~ 114/12/07	Combining the first and second laws and maxwell relations	
13	114/12/08 ~ 114/12/14	Physical transformations of pure substance (I)	
14	114/12/15 ~ 114/12/21	Physical transformations of pure substance (II)	
15	114/12/22 ~ 114/12/28	Simple mixture (I): Phase diagram of pure substances	
16	114/12/29 ~ 115/01/04	Final Week of Diverse Assessments	
17	115/01/05 ~ 115/01/11	Final Week of Diverse Assessments/Flexible Teaching Week for Teachers	
18	115/01/12 ~ 115/01/18	Flexible Teaching Week for Teachers	
Key capabilities		self-directed learning Information Technology Problem solving Interdisciplinary	
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	

Course Content	Logical Thinking Green Energy Sustainability issue
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Handouts Using teaching materials from other writers:Textbooks
References	1.Atkins' Physical Chemistry 12/e (Atkins) 2.Essentials of Physical Chemistry(David W. Ball) 3.Physical Chemistry: Pearson New International Edition, 3rd edition(Thomas Engel, Philip Reid)
Grading Policy	◆ Attendance : 10.0 % ◆ Mark of Usual : 10.0 % ◆ Midterm Exam : 30.0 % ◆ Final Exam : 30.0 % ◆ Other 〈 課堂練習+筆記 〉 : 20.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at https://web2.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 . ※"Adhere to the concept of intellectual property rights" and "Do not illegally photocopy, download, or distribute." Using original textbooks is advised. It is a crime to improperly photocopy others' publications.