Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	PHYSICAL AND CHEMICAL TREATMENT PROCESSES	Instructor	YA VINH
Course Class	TEWXM1A MASTER'S PROGRAM, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 1A	Details	◆ General Course ◆ Selective ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG6 Clean water and sanitation SDG9 Industry, Innovation, and Infrastructure SDG13 Climate action		

Departmental Aim of Education

Ⅰ. Cultivating students with capabilities of carrying out practical works or academic research related to water resources and environmental engineering.

Ⅱ. Cultivating students with capability of solving problems through researching, planning, and management.

Ⅲ. Cultivating students to become professional engineers with care in environment and professional ethics.

Ⅳ. Preparing students with the capabilities of engaging in international engineering business, to adapt to globalization and social needs, and to expand their global perspectives.

Subject Departmental core competences

A. Mathematical and engineering knowledge needed for water resources and environmental engineering applications.(ratio:20.00)

B. Capabilities of planning and conducting experiments, analyzing and explaining experimental data, applying information tool, and collecting and compiling data. (ratio:15.00)

C. Logical thinking, analysis, integration, problem-solving skills, engineering planning, design and implementation ability.(ratio:30.00)

D. Skill of using professional foreign language and global perspective.(ratio:20.00)

E. Capabilities of writing and presenting research report.(ratio:10.00)

F. Awareness of the importance of teamwork, working attitude and professional ethics, and to learn continuously.(ratio:5.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:20.00)

2. Information literacy. (ratio:20.00)

3. A vision for the future. (ratio:10.00)

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:5.00)

8. A sense of aesthetic appreciation. (ratio:5.00)

Course Introduction	Physical and chemical quality of water for human consumption, with focus on design aspects of physical and chemical operations and processes employed in the treatment of water and wastewater. Topics include coagulation, flocculation, solid-liquid separation, filtration, precipitation, adsorption, gas transfer, and disinfection. Includes a brief overview of key principles from physics and chemistry

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	By the end of this course, students should be able to (1) explain the principles of physical and chemical treatment processes, (2) design and evaluate systems using mass balances and kinetics, and (3) compare the effectiveness of these methods for contaminant removal in water and wastewater treatment.	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCDEF	12345678	Lecture, Discussion	Testing, Study Assignments, Discussion(including classroom and online), Report(including oral and written)

Course Schedule			
Week	Date	Course Contents	Note
1	114/09/15 ~ 114/09/21	Introduction	
2	114/09/22 ~ 114/09/28	Screen and comminution	
3	114/09/29 ~ 114/10/05	Flow Equalization and Neutralization	
4	114/10/06 ~ 114/10/12	Mixing	
5	114/10/13 ~ 114/10/19	Coagulation and Flocculation	
6	114/10/20 ~ 114/10/26	Chemical Precipitation	
7	114/10/27 ~ 114/11/02	Recarbonation and Softening	
8	114/11/03 ~ 114/11/09	Chemical Oxidation	
9	114/11/10 ~ 114/11/16	Midterm Exam Week	
10	114/11/17 ~ 114/11/23	Halogenation and Disinfection	
11	114/11/24 ~ 114/11/30	Ozonation	
12	114/12/01 ~ 114/12/07	Electrolysis	
13	114/12/08 ~ 114/12/14	Sedimentation	
14	114/12/15 ~ 114/12/21	Dissolved Air Flotation	
15	114/12/22 ~ 114/12/28	Gravity Filtration	
16	114/12/29 ~ 115/01/04	Group discussion	
17	115/01/05 ~ 115/01/11	Final Exam Week	
18	115/01/12 ~ 115/01/18	Flexible Teaching Week	
Key capabilities			
Interdisciplinary			

Distinctive teaching	
Course Content	Environmental Safety
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Presentations Using teaching materials from other writers:Textbooks Name of teaching materials: M. M. Benjamin & D. F. Lawler, Water Quality Engineering: Physical / Chemical Treatment Processes, Wiley, ISBN: 978-1-118-16965-0
References	M. M. Benjamin & D. F. Lawler, Water Quality Engineering: Physical / Chemical Treatment Processes, Wiley, ISBN: 978-1-118-16965-0 J. C. Crittenden et al., MWH's Water Treatment: Principles and Design, 3 rd Edition, Wiley, Print ISBN: 9780470405390, Online ISBN: 9781118131473
Grading Policy	◆ Attendance： 10.0 % ◆ Mark of Usual： % ◆ Midterm Exam： 40.0 % ◆ Final Exam： 50.0 % ◆ Other〈 〉： %
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.