

## Tamkang University Academic Year 112, 1st Semester Course Syllabus

Course Title	PHYSICAL AND CHEMICAL TREATMENT PROCESSES	Instructor	CHING-YU PENG
Course Class	TEWXM1A MASTER'S PROGRAM, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 1A	Details	<ul style="list-style-type: none"> <li>◆ General Course</li> <li>◆ Selective</li> <li>◆ One Semester</li> </ul>
Relevance to SDGs	<p>SDG6 Clean water and sanitation</p> <p>SDG9 Industry, Innovation, and Infrastructure</p> <p>SDG11 Sustainable cities and communities</p> <p>SDG12 Responsible consumption and production</p>		
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			
<p>I . Cultivating students with capabilities of carrying out practical works or academic research related to water resources and environmental engineering.</p> <p>II . Cultivating students with capability of solving problems through researching, planning, and management.</p> <p>III . Cultivating students to become professional engineers with care in environment and professional ethics.</p> <p>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.</p>			
Subject Departmental core competences			
<p>A. Mathematical and engineering knowledge needed for water resources and environmental engineering applications.(ratio:20.00)</p> <p>B. Capabilities of planning and conducting experiments, analyzing and explaining experimental data, applying information tool, and collecting and compiling data. (ratio:15.00)</p> <p>C. Logical thinking, analysis, integration, problem-solving skills, engineering planning, design and implementation ability.(ratio:30.00)</p> <p>D. Skill of using professional foreign language and global perspective.(ratio:20.00)</p> <p>E. Capabilities of writing and presenting research report.(ratio:10.00)</p> <p>F. Awareness of the importance of teamwork, working attitude and professional ethics, and to learn continuously.(ratio:5.00)</p>			
Subject Schoolwide essential virtues			
<p>1. A global perspective. (ratio:20.00)</p> <p>2. Information literacy. (ratio:20.00)</p> <p>3. A vision for the future. (ratio:10.00)</p>			

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

Through journal papers reading, understand and learn how to apply up-to-date environmental physical and chemical treatment processes for contaminants removal.

**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	1. Understand the theory and mechanisms governing physical and chemical treatment processes	Cognitive
2	Understand and apply the theory underlying each process	Cognitive

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCE	12345678	Lecture	Testing
2	ABCDF	12345678	Discussion	Report(including oral and written)

**Course Schedule**

Week	Date	Course Contents	Note

1	112/09/11 ~ 112/09/17	Introduction to physical-chemical treatment processes	
2	112/09/18 ~ 112/09/24	General Water Supply Design Considerations (I)	
3	112/09/25 ~ 112/10/01	General Water Supply Design Considerations (II)	
4	112/10/02 ~ 112/10/08	General Wastewater Collection and Treatment Design Considerations (I)	
5	112/10/09 ~ 112/10/15	General Wastewater Collection and Treatment Design Considerations (II)	
6	112/10/16 ~ 112/10/22	Coagulation and Flocculation (I)	
7	112/10/23 ~ 112/10/29	Coagulation and Flocculation (II)	
8	112/10/30 ~ 112/11/05	Coagulation and Flocculation (III)	
9	112/11/06 ~ 112/11/12	Reverse Osmosis and Nanofiltration (I)	
10	112/11/13 ~ 112/11/19	Midterm Exam	
11	112/11/20 ~ 112/11/26	Reverse Osmosis and Nanofiltration (II)	
12	112/11/27 ~ 112/12/03	Reverse Osmosis and Nanofiltration (III)	
13	112/12/04 ~ 112/12/10	Membrane Filtration (I)	
14	112/12/11 ~ 112/12/17	Membrane Filtration (II)	
15	112/12/18 ~ 112/12/24	Membrane Filtration (III)	
16	112/12/25 ~ 112/12/31	Tertiary Treatment (I)	
17	113/01/01 ~ 113/01/07	Tertiary Treatment (II)	
18	113/01/08 ~ 113/01/14	Final Exam	
Key capabilities	Problem solving		
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)		
Distinctive teaching			

Course Content	Logical Thinking Environmental Safety Sustainability issue
Requirement	1. There will be paper presentation, and journal review. Missed paper presentation or journal review counts as a zero.
Textbooks and Teaching Materials	Self-made teaching materials:Handouts
References	Selected papers Water Treatment Principles and Design, 2nd ed. by Montgomery Watson Harza
Grading Policy	◆ Attendance : 10.0 %    ◆ Mark of Usual :        %    ◆ Midterm Exam : 20.0 % ◆ Final Exam : 20.0 % ◆ Other 〈Oral Presentation〉 : 50.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at <a href="http://info.ais.tku.edu.tw/csp">http://info.ais.tku.edu.tw/csp</a> or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at <a href="http://www.acad.tku.edu.tw/CS/main.php">http://www.acad.tku.edu.tw/CS/main.php</a> .  <b>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</b>