

# Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	WASTEWATER ENGINEERING	Instructor	YA VINH			
Course Class	TEWXB3A DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 3A	Details	<ul style="list-style-type: none"> <li>♦ General Course</li> <li>♦ Required</li> <li>♦ One Semester</li> <li>♦ 3 Credits</li> </ul>			
Relevance to SDGs	SDG6 Clean water and sanitation SDG9 Industry, Innovation, and Infrastructure SDG13 Climate action					
Departmental Aim of Education						
<p>I. Educating students with the fundamental knowledge of mathematics, science and engineering to enable them to succeed in the practice or academic research related to water resources and environmental engineering.</p> <ol style="list-style-type: none"> <li>1. Training students with engineering basics to equip them with the capabilities of construction supervision and operation management.</li> <li>2. Cultivating students with ability of applying engineering theory and pursuing innovation to equip them with the capabilities of researching, planning, engineering design, integration and assessment.</li> <li>3. Training students with capacity to apply information technology in the engineering business.</li> </ol> <p>II. Cultivating students to become professional engineers with care in environment and professional ethics.</p> <ol style="list-style-type: none"> <li>1. Cultivating students with characters of respecting the nature and humane care.</li> <li>2. Cultivating students with engineering ethics and law-abiding character.</li> <li>3. Preparing students with the capabilities of exploring, analyzing, interpreting, and dealing with problems.</li> </ol> <p>III. Preparing students with the capabilities of engaging in domestic and international engineering business.</p> <ol style="list-style-type: none"> <li>1. Cultivating students with the capabilities of project management, presentation and communication skills, and teamwork.</li> <li>2. Preparing students with the capabilities of applying professional foreign language and expanding their global perspective.</li> <li>3. Cultivating students with cognitive and habits of continuous learning.</li> </ol>						
Subject Departmental core competences						
<p>A. Basic mathematical and engineering knowledge needed for water resources and environmental engineering applications.(ratio:20.00)</p> <p>B. Capabilities of engineering planning, design, and information applications.(ratio:20.00)</p>						

- C. Capabilities of logical thinking, analysis, integration, problem-solving skills, innovative design and engineering implementation.(ratio:30.00)
- D. Continuous learning of the up-to-date knowledge of professional engineering, professional foreign language skills and global perspective.(ratio:20.00)
- E. Awareness of the importance of teamwork and working attitude, and with cognition of professional ethics.(ratio:10.00)

Subject Schoolwide essential virtues

- 1. A global perspective. (ratio:25.00)
- 2. Information literacy. (ratio:15.00)
- 3. A vision for the future. (ratio:10.00)
- 4. Moral integrity. (ratio:5.00)
- 5. Independent thinking. (ratio:25.00)
- 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	In this course, Process kinetics, mass balance, reactor design, pretreatment, clarification, chemical treatment, biological treatment (aerobic and anaerobic), disinfection, sludge treatment, nitrogen and phosphorus removal will be discussed.
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**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
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1	<p>1. To understand and analyze the characteristics of water and wastewater</p> <p>2. To estimate the quantity of drinking water and domestic wastewater generated</p> <p>3. To understand the unit operations involved in the water supply systems and sewerage system</p> <p>4. To know the design process of water and waste water unit operations &amp; system</p>	Cognitive
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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, 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: Wastewater Treatment Processes	
2	114/09/22 ~ 114/09/28	Wastewater Flowrates and reaction vessels	
3	114/09/29 ~ 114/10/05	Process Selection Design, and Implementation Physical Unit Processes	
4	114/10/06 ~ 114/10/12	Chemical Unit Processes	
5	114/10/13 ~ 114/10/19	Chemical Unit Processes (Continue)	
6	114/10/20 ~ 114/10/26	Fundamentals of Biological Treatment	
7	114/10/27 ~ 114/11/02	Suspended Growth Biological Treatment Processes	
8	114/11/03 ~ 114/11/09	Attached Growth and Combined Biological Treatment Processes	
9	114/11/10 ~ 114/11/16	Anaerobic Suspended and Attached Growth Biological Treatment Processes	
10	114/11/17 ~ 114/11/23	Treatment Processes for Nutrient Removal	
11	114/11/24 ~ 114/11/30	Separation Processes for Removal of Residual Constituents	
12	114/12/01 ~ 114/12/07	Disinfection Processes	

13	114/12/08 ~ 114/12/14	Processes and Treatment of Sludges	
14	114/12/15 ~ 114/12/21	Biosolids Processing, Resource Recovery and Beneficial Use	
15	114/12/22 ~ 114/12/28	Wastewater Management: Future Challenges and Opportunities	
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			
Interdisciplinary			
Distinctive teaching			
Course Content			
Environmental Safety Green Energy			
Requirement			
Textbooks and Teaching Materials			
Self-made teaching materials:Presentations Using teaching materials from other writers:Textbooks Name of teaching materials: Metcalf & Eddy /AECOM. Wastewater Engineering: Treatment and Resource Recovery, 5th Edition, McGraw-Hill, 2013 (ISBN 13: 978-0073401188, ISBN 10: 0073401188)			
References			
Metcalf & Eddy /AECOM. Wastewater Engineering: Treatment and Resource Recovery, 5th Edition, McGraw-Hill, 2013 (ISBN 13: 978-0073401188, ISBN 10: 0073401188) Reynolds, Tom D., and Paul A. Richards. Unit operations and processes in environmental engineering. PWS Publishing company, 1996. Ameta, Suresh C., and Rakshit Ameta, eds. Advanced oxidation processes for wastewater treatment: emerging green chemical technology. Academic press, 2018.			
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>.

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