Tamkang University Academic Year 113, 2nd Semester Course Syllabus

Course Title	INDUSTRIAL FILTRATION PROCESSES	Instructor	YA VINH
Course Class	TEWXD1A DOCTORAL 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 SDG12 Responsible consumption and production		

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:10.00)

B. Capabilities of planning and conducting experiments, analyzing and explaining experimental data, applying information tool, and collecting and compiling data. (ratio:10.00)

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:30.00)

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:10.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:10.00)

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

4. Moral integrity. (ratio:10.00)

5. Independent thinking. (ratio:30.00)

6. A cheerful attitude and healthy lifestyle. (ratio:10.00)

7. A spirit of teamwork and dedication. (ratio:10.00)

8. A sense of aesthetic appreciation. (ratio:10.00)

Course Introduction	Filtration technology provides the process industries with novel methods of separation for purification, effluent control, water reuse and recovery of valuable components in applications ranging from chemical/petrochemical to environmental and biotechnology. This course will enable students to understand and solve filtration-based separation problems by acquiring in-depth knowledge in membrane processes/separation mechanisms, transport models, membrane permeability computations, membrane types, properties and modules, membrane reactors, system design, industrial applications and economics.

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	Acquire in-depth knowledge in the areas of membrane separation mechanisms, transport models, membrane permeability computations, membrane types and modules, membrane contactors / reactors and applications. Be able to select membrane processes for solving separation problems in the following applications: Water and Wastewater, Biotechnology and Biomedical Engineering, Gas Separations, Membrane Contactors and Reactors, Environmental and Energy	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, Report(including oral and written)

Course Schedule			
Week	Date	Course Contents	Note
1	114/02/17 ~ 114/02/23	Introduction	
2	114/02/24 ~ 114/03/02	Basics Principles	
3	114/03/03 ~ 114/03/09	Basics Principles (Continue)	
4	114/03/10 ~ 114/03/16	Filter media	
5	114/03/17 ~ 114/03/23	Filter media (Continue)	
6	114/03/24 ~ 114/03/30	Type of Filter	
7	114/03/31 ~ 114/04/06	Type of Filter (Continue)	
8	114/04/07 ~ 114/04/13	Liquid Filtration	
9	114/04/14 ~ 114/04/20	Midterm Exam	
10	114/04/21 ~ 114/04/27	Liquid Filtration (Continue)	
11	114/04/28 ~ 114/05/04	Oils and hydraulic systems	
12	114/05/05 ~ 114/05/11	Gas Filtration	
13	114/05/12 ~ 114/05/18	Other types of separation equipment	
14	114/05/19 ~ 114/05/25	Filter selection	
15	114/05/26 ~ 114/06/01	Group discussion	
16	114/06/02 ~ 114/06/08	Group discussion	
17	114/06/09 ~ 114/06/15	Final Exams Week	
18	114/06/16 ~ 114/06/22	Flexible Teaching Week	
Key capabilities		self-directed learning International mobility Information Technology Problem solving	
Interdisciplinary		STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist) Competency-based education 'competency exploration' sustained competency or global issues STEEP (Society, Technology, Economy, Environment, and Politics)	

Distinctive teaching	
Course Content	Logical Thinking Environmental Safety Green Energy Sustainability issue
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Presentations Using teaching materials from other writers:Textbooks Name of teaching materials: Sutherland, Kenneth S., and George Chase. Filters and filtration handbook. Elsevier, 2011.
References	Sutherland, Kenneth S., and George Chase. Filters and filtration handbook. Elsevier, 2011 Gray, Stephen, et al., eds. Advanced materials for membrane fabrication and modification. CRC 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 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 . **※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**