

## Tamkang University Academic Year 105, 2nd Semester Course Syllabus

Course Title	ENVIRONMENTAL SAMPLING AND MONITORING	Instructor	CHING-YU PENG
Course Class	TEWXD1A DOCTORAL PROGRAM, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 1A	Details	<ul style="list-style-type: none"> <li>◆ Selective</li> <li>◆ One Semester</li> <li>◆ 3 Credits</li> </ul>
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>			
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			
<p>A. With mathematical and engineering knowledge needed for water resources and environmental engineering applications.</p> <p>B. With capabilities of planning and conducting experiments, and analyzing and explaining experimental data.</p> <p>C. With capabilities to apply information tool, and to collect and compile data.</p> <p>D. With logical thinking, analysis, integration, and problem-solving skills.</p> <p>E. With engineering planning, design and implementation ability.</p> <p>F. With skill of using professional foreign language and global perspective.</p> <p>G. With capabilities of writing and presenting research report.</p> <p>H. Awareness of the importance of teamwork, working attitude and professional ethics, and to learn continuously.</p>			
Course Introduction	<p>Topics of environmental sampling, analysis, and monitoring are introduced.</p> <p>Environmental sampling design, techniques, quality assurance/quality control (QA/QC), wet chemical methods, sample preparation, and many instrumental methods are discussed.</p>		

## The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I.Objective Levels (select applicable ones) :

- (i) Cognitive Domain : C1-Remembering, C2-Understanding, C3-Applying,  
C4-Analyzing, C5-Evaluating, C6-Creating
- (ii) Psychomotor Domain : P1-Imitation, P2-Mechanism, P3-Independent Operation,  
P4-Linked Operation, P5-Automation, P6-Origination
- (iii) Affective Domain : A1-Receiving, A2-Responding, A3-Valuing,  
A4-Organizing, A5-Characterizing, A6-Implementing

II.The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :

- (i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.
- (ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3,C5,and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)
- (iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A,AD, and BEF, list all of the three in the box.)

No.	Teaching Objectives	Relevance	
		Objective Levels	Departmental core competences
1	1. Understand the theory and requirements for environmental sampling, analysis and monitoring	C2	ABF
2	2. Understand and apply the theory underlying environmental sampling, analysis, and monitoring	C4	ABCD

### Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	1. Understand the theory and requirements for environmental sampling, analysis and monitoring	Lecture	Report
2	2. Understand and apply the theory underlying environmental sampling, analysis, and monitoring	Lecture	Report

This course has been designed to cultivate the following essential qualities in TKU students			
Essential Qualities of TKU Students		Description	
◆ A global perspective		Helping students develop a broader perspective from which to understand international affairs and global development.	
◇ Information literacy		Becoming adept at using information technology and learning the proper way to process information.	
◆ A vision for the future		Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision.	
◆ Moral integrity		Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems.	
◆ Independent thinking		Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically.	
◇ A cheerful attitude and healthy lifestyle		Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life.	
◆ A spirit of teamwork and dedication		Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems.	
◇ A sense of aesthetic appreciation		Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process.	
Course Schedule			
Week	Date	Subject/Topics	Note
1	106/02/13 ~ 106/02/19	Introduction	
2	106/02/20 ~ 106/02/26	Basic of environmental sampling and analysis	
3	106/02/27 ~ 106/03/05	Environmental Sampling Design (I)	
4	106/03/06 ~ 106/03/12	Environmental Sampling Design (II)	
5	106/03/13 ~ 106/03/19	Environmental Sampling Techniques (I)	
6	106/03/20 ~ 106/03/26	Environmental Sampling Techniques (II)	
7	106/03/27 ~ 106/04/02	QA/AC control of environmental analysis (I)	
8	106/04/03 ~ 106/04/09	QA/AC control of environmental analysis (II)	
9	106/04/10 ~ 106/04/16	Common operations and wet chemical methods	
10	106/04/17 ~ 106/04/23	Midterm exam	
11	106/04/24 ~ 106/04/30	Sample preparation (I)	
12	106/05/01 ~ 106/05/07	Sample preparation (II)	

13	106/05/08 ~ 106/05/14	UV-Visible and IR spectroscopic methods	
14	106/05/15 ~ 106/05/21	Atomic Spectroscopy for metal analysis	
15	106/05/22 ~ 106/05/28	Chromatographic methods	
16	106/05/29 ~ 106/06/04	Electrochemical methods	
17	106/06/05 ~ 106/06/11	Environmental monitoring	
18	106/06/12 ~ 106/06/18	Final exam	
Requirement			
Teaching Facility	Computer, Projector		
Textbook(s)	Emma P. Popek , "Sampling and Analysis of Environmental Chemical Pollutants", ISBN: 978-0-12-561540-2		
Reference(s)	selected papers		
Number of Assignment(s)	(Filled in by assignment instructor only)		
Grading Policy	◆ Attendance : 10.0 %    ◆ Mark of Usual :       %    ◆ Midterm Exam : 30.0 % ◆ Final Exam : 40.0 % ◆ Other (paper presentation) : 20.0 %		
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>		