

Tamkang University Academic Year 106, 1st Semester Course Syllabus

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| Course Title | AQUATIC CHEMISTRY | 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"> ◆ Required ◆ One Semester ◆ 3 Credits |
| 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. Mathematical and engineering knowledge needed for water resources and environmental engineering applications.</p> <p>B. Capabilities of planning and conducting experiments, analyzing and explaining experimental data, applying information tool, and collecting and compiling data.</p> <p>C. Logical thinking, analysis, integration, problem-solving skills, engineering planning, design and implementation ability.</p> <p>D. Skill of using professional foreign language and global perspective.</p> <p>E. Capabilities of writing and presenting research report.</p> <p>F. Awareness of the importance of teamwork, working attitude and professional ethics, and to learn continuously.</p> | | | |
| Course Introduction | Principles of chemical equilibrium involved in the treatment of water and wastewater are introduced. The effects of chemical interaction of domestic and industrial waste effluents on natural water system are discussed. | | |
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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 principles of chemical equilibrium and application | C2 | AC |

Teaching Objectives, Teaching Methods and Assessment

| No. | Teaching Objectives | Teaching Methods | Assessment |
|-----|--|--------------------------------------|-------------------------|
| 1 | 1. Understand the principles of chemical equilibrium and application | Lecture, Discussion, Problem solving | Written test, Practicum |
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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 | 106/09/18 ~ 106/09/24 | Introduction, Basic concept | |
| 2 | 106/09/25 ~ 106/10/01 | Fundamentals of thermodynamics | |
| 3 | 106/10/02 ~ 106/10/08 | Acid and base (I) | |
| 4 | 106/10/09 ~ 106/10/15 | Acid and base (II) | |
| 5 | 106/10/16 ~ 106/10/22 | Acid and base (III) | |
| 6 | 106/10/23 ~ 106/10/29 | Titration and buffer (I) | |
| 7 | 106/10/30 ~ 106/11/05 | Titration and buffer (II) | |
| 8 | 106/11/06 ~ 106/11/12 | Software for solving Chemical equilibrium (I) | |
| 9 | 106/11/13 ~ 106/11/19 | Software for solving Chemical equilibrium (II) | |
| 10 | 106/11/20 ~ 106/11/26 | Midterm Exam | |
| 11 | 106/11/27 ~ 106/12/03 | Gas/liquid equilibrium (I) | |
| 12 | 106/12/04 ~ 106/12/10 | Gas/liquid equilibrium (II) | |

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|-------------------------|--|------------------------------|--|
| 13 | 106/12/11 ~ 106/12/17 | Gas/liquid equilibrium (III) | |
| 14 | 106/12/18 ~ 106/12/24 | Metals (I) | |
| 15 | 106/12/25 ~ 106/12/31 | Metals (II) | |
| 16 | 107/01/01 ~ 107/01/07 | Metals (III) | |
| 17 | 107/01/08 ~ 107/01/14 | Oxidation/reduction | |
| 18 | 107/01/15 ~ 107/01/21 | Final Exam | |
| Requirement | | | |
| Teaching Facility | Computer, Projector | | |
| Textbook(s) | Water Chemistry, Mark M. Benjamin. | | |
| Reference(s) | | | |
| Number of Assignment(s) | 10 (Filled in by assignment instructor only) | | |
| Grading Policy | ◆ Attendance : % ◆ Mark of Usual : % ◆ Midterm Exam : 30.0 % ◆ Final Exam : 40.0 % ◆ Other <HW> : 30.0 % | | |
| 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. | | |