Tamkang University Academic Year 111, 1st Semester Course Syllabus

Course Title	ENVIRONMENTAL TOXICOLOGY	Instructor	
Course Class	TEWBB2A DIVISION OF ENVIRONMENTAL ENGINEERING, DEPARTMENT OF WATER RESOURCES AND ENVIRONMENTAL ENGINEERING, 2A	Details	◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	SDG3 Good health and well-being for people SDG6 Clean water and sanitation SDG11 Sustainable cities and communities SDG15 Life on land		

Departmental Aim of Education

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.

1. Training students with engineering basics to equip them with the capabilities of construction supervision and operation management.
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.
3. Training students with capacity to apply information technology in the engineering business.

Ⅱ. Cultivating students to become professional engineers with care in environment and professional ethics.

1. Cultivating students with characters of respecting the nature and humane care.
2. Cultivating students with engineering ethics and law-abiding character.
3. Preparing students with the capabilities of exploring, analyzing, interpreting, and dealing with problems.

Ⅲ. Preparing students with the capabilities of engaging in domestic and international engineering business.

1. Cultivating students with the capabilities of project management, presentation and communication skills, and teamwork.
2. Preparing students with the capabilities of applying professional foreign language and expanding their global perspective.
3. Cultivating students with cognitive and habits of continuous learning.

Subject Departmental core competences

A. Basic mathematical and engineering knowledge needed for water resources and environmental engineering applications.(ratio:30.00)

B. Capabilities of Engineering drawings, measurement, design, construction, and application of information related tools.(ratio:5.00)

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:15.00)

Subject Schoolwide essential virtues
1. A global perspective. (ratio:10.00) 2. Information literacy. (ratio:5.00) 3. A vision for the future. (ratio:10.00) 4. Moral integrity. (ratio:15.00) 5. Independent thinking. (ratio:30.00) 6. A cheerful attitude and healthy lifestyle. (ratio:20.00) 7. A spirit of teamwork and dedication. (ratio:5.00) 8. A sense of aesthetic appreciation. (ratio:5.00)

Course Introduction	This course will introduce the toxic substances in our environment including toxic metals (e.g. Hg, Cd, As, Pb, and Sn) and organic compounds (e.g. polychlorobiphenyls(PCBs), dioxin, biphenol A, and pesticides).

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: To understand basic concepts of toxicity 2: To familiar with fundamentals of toxic substances 3: To focus on where and how certain pollutants may occur in the environment 4: A brief review of major pollutant episodes and disasters 5: To understand the acute and chronic effects 6: To discuss several routs in which environmental pollutants effect on humans 7: To understand the contents of environmental toxic substances	Cognitive

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, Discussion(including classroom and online), Report(including oral and written), Activity Participation

Course Schedule

Week	Date	Course Contents	Note
1	111/09/05 ~ 111/09/11	Introduction to Environmental toxicity: - Course introduction/syllabus	Read Ch1 (peek @Ch13&14)
2	111/09/12 ~ 111/09/18	Introduction to Environmental toxicity: - Introduction to environmental toxicity	Read Ch1 (peek @Ch13&14)
3	111/09/19 ~ 111/09/25	Background information: - Background chemistry concepts and definitions	Read Ch2 pgs 94-98
4	111/09/26 ~ 111/10/02	Background information: -Major classes of contaminant	Read Ch2 pgs 33-42 Read Ch2 pgs 43-70 Read Ch2 pgs 70-94
5	111/10/03 ~ 111/10/09	Background information: - Major classes of contaminant (continued)	Read Ch2 pgs 33-42 Read Ch2 pgs 43-70 Read Ch2 pgs 70-94
6	111/10/10 ~ 111/10/16	Routes and kinetics of toxicant uptake: - Update, biotransformation detoxification, elimination, and accumulation	- Read Ch3 pgs 99-127
7	111/10/17 ~ 111/10/23	Routes and kinetics of toxicant uptake:- Factors influencing bioaccumulation	- Read Ch4 pgs 129-155
8	111/10/24 ~ 111/10/30	Routes and kinetics of toxicant uptake:- Bioaccumulation from food and trophic transfer	- Read Ch5 pgs 157-180
9	111/10/31 ~ 111/11/06	Case studies - Contaminant case studies presented by students	

10	111/11/07 ~ 111/11/13	Midterm Exam Week	
11	111/11/14 ~ 111/11/20	- Contaminants case studies presented by students	
12	111/11/21 ~ 111/11/27	Molecular Effects and biomarkers: - Molecular effects and biomarkers - Cells, tissues, and organs	- Read Ch6 pgs 181-208 - Read Ch7 pgs 209-234
13	111/11/28 ~ 111/12/04	Molecular Effects and biomarkers:- Sublethal effects to individuals	- Read Ch8 pgs 235-274
14	111/12/05 ~ 111/12/11	Molecular Effects and biomarkers:- Acute and chromic lethal effects to individuals	- Read Ch9 pgs 275-304
15	111/12/12 ~ 111/12/18	Impacts of toxicants: - Effects on populations	- Read Ch10 pgs 305-342
16	111/12/19 ~ 111/12/25	Impacts of toxicants: - Effects on communities and ecosystems - Landscape to global effects	- Read Ch11 pgs 343-375 - Read Ch12 pgs 377-396
17	111/12/26 ~ 112/01/01	Regulatory policies and international treaties: - Risk assessment of contaminants - Environmental law and regulations	- Read Ch13 pgs 397-423 - Skim appendices 3-8
18	112/01/02 ~ 112/01/08	Final Exam Week	

Requirement	
Teaching Facility	(None)
Textbooks and Teaching Materials	Fundamentals of Ecotoxicology: The Science of Pollution, Fourth Edition, 2015, by Michael C. Newman. Published by CRC Press, Taylor & Francis Group, Boca Raton, FL. 654 pgs.
References	
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： 10.0 % ◆ Mark of Usual： % ◆ Midterm Exam： 40.0 % ◆ Final Exam： 30.0 % ◆ Other〈Group report〉：20.0 %
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.**