



Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAED 323 Environmental Engineering Laboratory
Credit (study hours) : 1 (0-3-1)
2. **Program Name** : Bachelor of Engineering in Environmental and Disaster Management
3. **Course Module** : Major Required Courses
Pre/co-requisite : KAED 312 Environmental Unit Operations
4. **Class Semester** : 1st Semester 2nd Semester Academic Year 2021
5. **Class Schedule & Venue** : Wednesday 09:00 – 12:00, Room L-306, Laboratory Building
6. **Class Coordinator** : Dr. Pensiri Prachakittikul
 Contact No. : 08-6024-0919 Email : pensiri.prc@mahidol.edu

7. Course Description

Skill practices for environmental engineering in laboratory, sedimentation, filtration, adsorption, ion-exchange, anaerobic digestion, activated sludge treatment process, UASB process, investigation the kinetics of biological system, calculation F/M ratio, sludge age, SVI and air treatment.

8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
1	Conduct experiments, analyze and interpret results of an experiment for engineering design of unit operation for environmental engineering	1-4	1-10	1-7	1, 2, 4, 5
2	Perform and/or explain air sampling equipment used in the field, treating samples in the laboratory	1-4	1-10	1-7	1, 2, 4, 5
3	Perform mathematical calculations required for laboratory analysis of unit operation for environmental engineering	1-4	1-10	1-7	1, 2, 4, 5
4	Write a laboratory summary of experiments performed	1-4	1-10	1-7	1, 2, 4, 5
5	Understand and explain the engineering principles of each unit operation for environmental engineering	1-5	1-10	1-7	1, 2, 4, 5, 6

9. Class Instructor List

- 1) Asst. Prof. Dr. Arika brihdikitti (AB) Contact No.: 084-660-2919 Email: arika.bri@mahidol.edu
- 2) Dr. Pensiri Prachakittikul (PP) Contact No.: 086-024-0919 Email: pensiri.prc@mahidol.edu
- 3) Dr. Wimonmas Boonyungyuen (WB) Contact No.: 081-906-6678 Email: bwimonmas@yahoo.com
- 4) Lect. Monchai Pumkaew (MP) Contact No.: 081-553-4346 Email: monchai.pum@mahidol.edu

9.1 Scientist List

- 1) Miss Phirata Khunode (PK) Contact No.: 089-248-0181 Email: phirata.khu@mahidol.ac.th
- 2) Mr. Suphat Prasopsin (SP) Contact No.: 087-151-2945 Email: suphat.pra@mahidol.ac.th
- 3) Mr. Phong Srithongdee Contact No.: 063-165-9657 Email: phong.srt@mahidol.ac.th

10. Course Outline

Week	Date	Contents	CLOs	Teaching & Learning	Groups	Instructor's Names
1	5/ 01/2022	- Course outline evaluation and criteria - Explain the experimental methods in biological wastewater treatment	-	Explain Brief lecture	All Groups	PP
2	12/01/2022	Activated sludge process I & Anaerobic process I	1, 3, 4, 5	Brief lecture E-learning Self-study Lab practice Ask and answer Group discussion Ask and answer Brief lecture E-learning Self-study Lab practice Ask and answer Group discussion Ask and answer	All Groups	PP/WB
3	19/01/2022	Sedimentation I Flocculation & Coagulation I			All Groups	PP
4	26/01/2022	Sedimentation II Flocculation & Coagulation II			All Groups	PP
5	2/02/2022	Summary: Sedimentation, Flocculation, Coagulation			All Groups	PP/WB
6	9/02/2022	Activated sludge process II & Anaerobic process II			All Groups	PP/WB
7	16/02/2022	Activated sludge process III & Anaerobic process III			All Groups	PP/WB
8	23/02/2022	Summary: Activated sludge process, Anaerobic process			All Groups	PP/WB
2/03/2022 Mid-term Examination						
9	9/03/2022	Air sampling (TSP/ PM10)	1-5	Brief lecture E-learning Self-study Lab practice Ask and answer	G.1, G.2	AB
		Chemical precipitation			G.3, G.4	PP
10	16/03/2022	Air sampling (TSP/ PM10)			G.3, G.4	AB
		Chemical precipitation			G.1, G.2	PP

Week	Date	Contents	CLOs	Teaching & Learning	Groups	Instructor's Names		
11	23/03/2022	Adsorption	1, 3, 4, 5	Brief lecture E-learning Self-study Lab practice Ask and answer	G.1, G.2	MP		
		Respiration dust			G.3, G.4	PP		
12	30/03/2022	Adsorption			G.3, G.4	MP		
		Respiration dust			G.1, G.2	PP		
13	6/04/2022	Reverse osmosis/ Ion exchange resin			G.1, G.2	WB		
		Oxygen mass transfer			G.3, G.4	PP		
14	20/04/2022	Reverse osmosis/ Ion exchange resin			G.3, G.4	WB		
		Oxygen mass transfer			G.1, G.2	PP		
15	27/04/2022	Summary			1-5	Group discussion Ask and answer	All groups	PP
4/05/2022 Final Examination								

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	- Content week 2-8 - Closed book	1, 3, 4, 5	-	25
11.2	Final exam	- Content week 9-15 - Closed book	1-5	-	35
11.3	Lab reports	Send the lab report on time/ Lab report quality/ presentation	1-4	1-8 9-15	40
11.4	Class participation	Student must attend class 100 % of course	1-3	1-8, 10-18	0
				Total	100

12. Grading System

Criterion-referenced evaluation

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	≥ 80 %	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

13. References

- 1) Metcalf & Eddy, Inc. Wastewater engineering: Treatment, Disposal and Reuse. 3rd edition. New York: McGraw-Hill. 1991.
- 2) Reynolds and Richards, editors. Unit Operations and Processes in Environmental Engineering. 2nd ed. PWS Publishing Company; 2002.

Note:

Specific Skill (SS)	
SS1	Laboratory skills
SS2	Steps in analytical procedure (sampling, preservation, analysis and interpretation of experimental results)
SS3	Preparing and performing laboratory experiments
SS4	Preparation of laboratory reports
Generic Skill (GS)	
GS1	Systematic Thinking, Problem Solving and Analytical Skills
GS2	Basic Computer Skills
GS3	Disaster Risk Awareness
GS4	Professional Ethics and Responsibilities
GS5	An ability to function on multidisciplinary teams
GS6	An ability to communicate effectively
GS7	The broad education necessary to understand the impact of engineering solutions in a economic, environmental, and societal context
GS8	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
GS9	A knowledge of contemporary issues
GS10	A recognition of the need for, and an ability to engage in life-long learning
Knowledge (K)	
K1	Water quality
K2	Wastewater characteristics
K3	Environmental unit operation for water and wastewater treatment
K4	Standards of effluents
K5	Sampling methods of air pollution
K6	Environmental unit operation for air pollution control
K7	Physico chemical and biological wastewater treatments
PLOs	
PLO1	Apply environmental engineering principles and knowledge to systematic solutions according to professional standards
PLO2	Apply practical skills in environmental engineering and disaster management to real situations based on academic principles and professional ethics
PLO4	Effectively present and discuss engineering knowledge to relate professional people for objective fulfillment by using proper language and media
PLO5	Work as an environmental engineer with other people to solve complicated problems according to economic, social, and environmental issues
PLO6	Develop a creative technology in environmental engineering and disaster management