



Course Syllabus (Academic Year 2022)

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 323 Environmental Engineering Laboratory
4. **Class Semester** : 1st Semester 2nd Semester Academic Year 2022
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 from systematic planning based on the principle of environmental unit process.	SS1-SS3 -Experimentation -Data interpretation -Laboratory works -Practical design	GS1-GS6 -Self-discipline -Professional ethics and responsibility	K1-K7	2 (Practical)
2	Perform engineering calculations related to environmental unit operations.	SS1-SS3 -Mathematic solving -Statistics	GS1-GS6	K1-K7 Science and Mathematics	1 (Reinforced)
3	Communicate the experimental steps, analysis, discussion, conclusions, and recommendations through the written report.		GS4 -Communication -Writing skill	-Language -MS office program tools	4 (reinforced)

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
4	Apply an understanding of the fundamental principles underlying environmental unit operation through practical experimentation	SS1-SS4 Professionalism	GS1-GS6	K1-K7 - Wastewater Engineering -Water Supply Engineering -Air Pollution	1 (Reinforced),

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) Dr. Watchapol Wonglertarak (WW) Contact No.: 085-849-3199 Email: watchapol.won@mahidol.ac.th

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	11/ 01/2023	- Course outline and evaluation criteria	-	Explain Brief lecture	All Groups	PP
2	18/01/2023	L. 8 Activated sludge process I	1, 3, 4, 5	Brief lecture E-learning Self-study Lab practice	G.1-G.3	WW
		L.10 Anaerobic process I			G.1-G.3	WB
		L. 5 Sedimentation I (Flocculated free settling)			G.4-G.6	PP
3	25/01/2023	L. 8 Activated sludge process II			G.1-G.3	WW
		L. 10 Anaerobic process II			G.1-G.3	WB
		L. 5 Sedimentation II (Hindered and compression settling) L. 9 Flocculation & Coagulation			G.4-G.6	PP
4	1/02/2023	L. 8 Activated sludge process I			G.4-G.6	WW

Week	Date	Contents	CLOs	Teaching & Learning	Groups	Instructor's Names			
		L. 10 Anaerobic process I			G.4-G.6	WB			
		L. 5 Sedimentation I (Flocculated free settling)			G.1-G.3	PP			
5	8/02/2023	L.8 Activated sludge process II			G.4-G.6	WW			
		L.10 Anaerobic process II			G.4-G.6	WB			
		L.5 Sedimentation II (Hindered and compression settling)			G.1-G.3	PP			
		L.9 Flocculation & Coagulation							
6	15/02/2023	L. 8 Activated sludge process III L. 10 Anaerobic process III			All groups	WW/WB			
7	22/02/2023	L. 2 Reverse osmosis and Ion exchange resin			G.1-G.3	WB			
		L. 1 Chemical precipitation			G.4-G.6	PP			
8	1/03/2023	L. 2 Reverse osmosis/ Ion exchange resin			G.4-G.6	WB			
		L. 1 Chemical precipitation			G.1-G.3	PP			
7-10 March 2023 Mid-term Examination									
9	15/03/2023	L. 4 Air sampling (TSP/ PM10)	1-5		Brief lecture E-learning Self-study Lab practice	G.1-G.3	AB		
		L. 3 Oxygen mass transfer				G.4-G.6	PP		
10	22/03/2023	L. 4 Air sampling (TSP/ PM10)				G.4-G.6	AB		
		L. 3 Oxygen mass transfer		G.1-G.3		PP			
11	29/03/2023	L. 7 Batch adsorption		G.1-G.3		PP			
		L. 6 Respiration dust		G.4-G.6		AB			
12	5/04/2023	L. 7 Batch adsorption		G.4-G.6		PP			
		L. 6 Respiration dust		G.1-G.3		AB			
13	12/04/2023	L. 7 Continuous adsorption		1, 3, 4, 5		G.1-G.3	PP		
		L. 11 Breakpoint chlorination				G.4-G.6	WW		
14	19/04/2022	L. 7 Continuous adsorption				G.4-G.6	PP		
		L. 11 Breakpoint chlorination				G.1-G.3	WW		
15	26/04/2022	Wrap up					All groups	PP	
4/05/2022 Final Examination									

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam (Theory Exam)	- Content of Lab 1, 2, 5, 8, 9, 10 - Closed book	1-4	-	25
11.2	Final exam (Theory Exam)	- Content of Lab 3, 4, 6, 7, 11 - Closed book	1-4	-	20
11.3	Laboratory reports	Laboratory report rubric	1-4	1-8 9-15	50
11.4	Class participation	Class collaboration rubric	1-3	1-8, 9-15	5
				Total	100

ข้อตกลง

1. นักศึกษาต้องเข้าเรียนทุกคลาส
2. หากมีเหตุจำเป็นต้องขาดเรียน ต้องส่งใบลา (ลากิจ ลาป่วย) พร้อมใบรับรองแพทย์หรือไปยินยอมจากผู้ปกครอง การปลอมแปลงเอกสารถือเป็นความผิดทางวินัยของนักศึกษา จะต้องถูกพิจารณาโทษตามระเบียบของมหาวิทยาลัย
3. การเข้าเรียนตรงเวลาเป็นสิ่งจำเป็น หากเข้าเรียนช้ากว่า 15 นาที ถือว่ามาสาย หากมาสายเกิน 3 ครั้ง คิดเป็นการขาดเรียน 1 ครั้ง
4. หากเข้าเรียนสายเกินกว่า 1 ชั่วโมง คิดเป็นการขาดเรียน 1 ครั้ง
5. หากเข้าเรียนน้อยกว่า 80 % ของคลาสเรียนทั้งหมด จะไม่สามารถสอบปลายภาคได้ และจะได้รับเกรด F ในรายวิชานี้

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.
- 3) หลักสูตรวิศวกรรมสิ่งแวดล้อมและการจัดการภัยพิบัติ, คู่มือปฏิบัติการหน่วยปฏิบัติการวิศวกรรมสิ่งแวดล้อม, วิทยาเขตกาญจนบุรี, มหาวิทยาลัยมหิดล, 2565.

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	Professional Ethics and Responsibilities
GS4	An ability to communicate effectively
GS5	The broad education necessary to understand the impact of engineering solutions in a economic, environmental, and societal context
GS6	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
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 (Reinforced)	Apply environmental engineering principles and knowledge to systematic solutions according to professional standards
PLO2 (Reinforced)	Apply practical skills in environmental engineering and disaster management to real situations based on academic principles and professional ethics
PLO 4 (Reinforced)	Effectively present and discuss engineering knowledge to related professional people for objective fulfillment by using proper language and media