



Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAED 231 Microbiology for Environmental Engineering
Credit (study hours) :2(2-0-4).....
2. **Program Name** : Bachelor of Engineering program in Environmental Engineering and Disaster Management
3. **Course Module** : Specific course
Pre/co-requisite :None.....
4. **Class Semester** : 1st Semester 2nd Semester Academic Year 2021
5. **Class Schedule & Venue** :(Tuesday, 13:00 – 15:00).....
6. **Class Coordinator** : Monchai Pumkaew
 Contact No. : 061 4644 663 Email :monchai.pum@mahidol.edu

7. Course Description

An introduction to microbial metabolism and growth; the role of microorganisms in biological treatment; kinetics and stoichiometry of biological growth; microbial ecology and community in wastewater; relationships and roles of the bacteria on nitrogen, phosphorus, and sulfur cycles; pathogenic bacteria and general biotechnology in environmental engineering.

8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
8.1	Student can categorize type and group of microorganism related to environmental engineering works.	S1	G2		1.1 / 4/2
8.2	Student can explain the significant role of microorganism related to environmental engineering works.	S1	G5		1.1
8.3	Student can explain the basic principle and techniques in measurement, analysis and	S1	G5		1.3

	classification the microorganism in environmental treatment system				
8.4	Student can explain the key factors influencing growth and controlling of microorganisms in treatment system	S2	G5		1.4 / 4.3

9. Class Instructor List

9.1 Name : Monchai Pumkaew,Ph.D. Contact No. : 061 4644 663 Email : monchai.pum@mahidol.edu

10. Course Outline

Week	Date (Y2021)	Contents	CLOs	Teaching & Learning	Instructor's Names
1	18 Jan	Basic knowledge of microbiology - Structure and function of cell - Metabolism in microorganism - Microbial growth and factors	CLO 1	Lecture / presentation/ multimedia	MP
2	26 Jan	Diversity of microorganism in ecosystem and Environment Role of microorganism related to environmental engineering works	CLO 1	Lecture / presentation/ multimedia	MP
3	XX Feb	Microorganism in water and wastewater	CLO 2	Lecture / presentation/ multimedia	MP
4	XX Feb	Categorization the prokaryotic microorganism and its application	CLO 3	Lecture / presentation/ multimedia	MP
5	15 Feb	Categorization the eukaryotic microorganism and its application	CLO 3	Lecture / presentation/ multimedia	MP
6	22 Feb	Microbial genetic and biotechnology of microorganism	CLO 4	Lecture / presentation/ multimedia	MP

7	1 Mar	kinetics and stoichiometry of biological growth	CLO 4	Lecture / presentation/ multimedia	MP
8	8 Mar	Microbial ecology in activated sludge treatment	CLO 2	Lecture / presentation/ Lab demonstration	MP
9	Mid-term Examination (Mar 14-18 , 2022)				
10	22 Mar	Microorganism in Nitrogen cycle	CLO 2	Lecture / presentation/ multimedia	MP
11	29 Mar	Microorganism in Phosphorus cycle	CLO 2	Lecture / presentation/ multimedia	MP
12	5 Apr	Microorganism in sulfur cycle	CLO 2	Lecture / presentation/ multimedia	MP
13	XX Apr	Problems in biological treatment causing by microorganism	CLO 4	Lecture / presentation/ multimedia/ discussion	MP
14	19 Apr	Measurement techniques and analysis to categorize microorganism type in environment	CLO 4	Lecture / presentation/ multimedia	MP
15	26 Apr	Pathogens and biotechnology	CLO 4	Lecture / presentation/ multimedia	MP
16	3 May	Biotechnology perspective and beneficial microorganism	CLO 4	Lecture / presentation/ discussion	MP
17	Final Examination (May 9-20, 2022)				

Remark: xx (to be announced)

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	close-book exam	1, 2, 3, 4	8	25 20
11.2	Final exam	close-book exam	1, 2, 3, 4	17	25 20
11.3	Quiz	Via online test, e.g. google form.	1, 2, 3, 4	3, 5, 10, 14	10
11.4	Reports / Assignments	Submit via google classroom	1, 2, 3, 4	all	<u>30</u> 40
11.5	Class participation	Sign name and student must attend a class not less than 80% of the whole course	-	all	10
				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 %

Norm-referenced evaluation

*If use both criterion and norm-referenced evaluation, please tick two boxes.

13. References

- 13.1 วิบูลย์ลักษณ์ ฟังรัมย์. 2556. ชีววิทยาสำหรับวิศวกรสิ่งแวดล้อม. กรุงเทพฯ : สำนักพิมพ์จุฬาลงกรณ์มหาวิทยาลัย.
- 13.2 กรรณิการ์ ชูเกียรติวัฒนา. 2561. จุลชีววิทยา สำหรับนักวิทยาศาสตร์และวิศวกรสิ่งแวดล้อม (พิมพ์ครั้งที่ 1). กรุงเทพฯ : สำนักพิมพ์แห่งจุฬาลงกรณ์มหาวิทยาลัย.
- 13.3 วสุ ปฐมอารีย์. 2561. จุลชีววิทยาและการประยุกต์ (พิมพ์ครั้งที่ 1). เชียงใหม่ : ศูนย์บริหารงานวิจัย มหาวิทยาลัยเชียงใหม่.
- 13.4 สุบัณฑิต นิมรัตน์. 2548. จุลชีววิทยาของน้ำเสีย(พิมพ์ครั้งที่ 1). กรุงเทพฯ : สำนักพิมพ์แห่งจุฬาลงกรณ์มหาวิทยาลัย.
- 13.5 Seviour, R., & Nielsen, P. H. (Eds.). (2010). Microbial ecology of activated sludge. IWA publishing
- 13.6 Brock, T. D., Madigan, M. T., Martinko, J. M., & Parker, J. (2003). Brock biology of microorganisms. Upper Saddle River (NJ): Prentice-Hall, 2003.