



Course Plan

Environmental Chemistry

3 credit hours

Course Outcome:

After finishing this course, students are able to:

(CO-1) show the value of honesty, independence and responsibility in determining attitudes towards the environment

(CO-2) analyse various environmental problems and solve these problems using their chemical concepts.

(CO-3) collaborate with colleagues to make the right decisions related to solving various problems in the environment.

(CO-4) analyse various pollutants in the environment and propose appropriate solutions to minimize and reduce the impact of these pollutants on the environment.

Relations between course outcome and program learning outcomes are as follows:

Course Outcome (CO)	Program Learning Outcome (PLO)								
	1	2	3	4	5	6	7	8	9
CO-1	√								
CO-2			√						
CO-3						√			
CO-4							√		√

Program Learning Outcome

(PLO-1) Cooperate and have social sensitivity and concern for society and the environment

(PLO-2) Demonstrating a responsible attitude towards work in his/her area of expertise independently.

(PLO-3) Understand the theoretical concepts and applications of chemical structure, dynamics, and energy, separation, analysis, synthesis and characterization (content knowledge) as the basis for carrying out chemical education research.

(PLO-4) Integrating chemistry concepts, pedagogical chemistry knowledge, curriculum, methodology, media, evaluation, classroom management, and ICT in chemistry learning (technological pedagogical and content knowledge) as a support in conducting chemistry education research.

(PLO-5) Understanding the research methodology of chemistry education and the characteristics of its research procedures in supporting educational programs for sustainable development and increasing the relevance of chemistry education to society.

(PLO-6) Able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and technology that pays attention to and applies humanities values in accordance with the research field of chemistry education.

(PLO-7) Planning, managing, and evaluating chemistry learning in schools according to the characteristics of the material (content knowledge) and the characteristics of students,



learning approaches, learning resources, learning media (pedagogical knowledge), as well as relevant information and communication technology (technological knowledge) innovative and adaptive.

(PLO-8) Identifying problems and determining alternative solutions based on theory and research findings, as well as designing and implementing them in chemical education research

(PLO-9) Developing problem-solving plans in supporting educational programs for sustainable development and increasing the relevance of chemistry education to society.

Description:

This course provides students with experience in analysing chemical concepts related to the interaction of chemicals with the biotic, abiotic, and social environment. Lecture materials focus on the sources, reactions, transportation, effects and condition of chemical species in the air, water, and soil environment, as well as the influence of human activities on these processes. Lectures are carried out with discussions, demonstrations, and assignments that provide students with experience in solving environmental problems. The environmental problems are related to the local context issues.

Textbooks and Suggested Readings:

1. Priyambodo, E. (2021) Kimia Lingkungan: Tinjauan secara Socio Scientific Issue untuk Pembangunan Berkelanjutan.
2. Lichtfouse, E., Schwarzbauer, J., Robert, D. (2005). Environmental Chemistry: Green Chemistry and Pollutants in Ecosystems. Berlin: Springer.
3. Andrews, J.E., Brimblecombe, P., Jickells, T.D., Liss, P.S. & Reid, B.J. (2004). An Introduction of Environmental Chemistry 2nd ed. Oxford: Blackwell Publishing
4. Radojevic, M. & Bashkin, V. N. (1999) Practical environmental Analysis. Cambridge: Royal Society of Chemistry.
5. Alloway, B.J. & Ayers, D.C. (1994) Chemical Principles of Environmental Pollution. London: Blackie
6. Harrison, R.M. (1992). Understanding our Environment: An Introduction to Environmental Chemistry and Pollution 2nd ed. Cambridge: Royal Society of Chemistry.
7. North, C.M., Rice, M.B., Ferkol, T., Gozal, D., Hui, C., Jung, S.H., Kuribayashi, K., McCormack, M.C., Mishima, M., Morimoto, Y., Song, Y., Wilson, K.C., Kim, W.J., & Fong, K.M. (2019) Air Pollution in the Asia-Pacific Region. A Joint Asian Pacific Society of Respiriology/American Thoracic Society Perspective. Am. J. Respir. Crit. Care Med. 199: 693–700. doi: 10.1164/rccm.201804-0673PP.

Instructor:

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Evaluation:

Course evaluation will be carried out through (1) assignments (task and quiz), (2) mid-term exam, (3) final exam, and (4) activity. Determination of final grade is as follows:



Final score = 45% assignments + 20% mid-term exam + 20% final exam + 15% activity

The final score then converted into the grade as follows:

Final score	Conversion	
	Grade	Points
86 – 100	A	4.00
81 – 85	A-	3.67
76 – 80	B+	3.33
71 – 75	B	3.00
66 – 70	B-	2.67
61 – 65	C+	3.33
56 – 60	C	2.00
41 – 55	D	1.00
0 – 40	E	0.00

For passing this course, students must obtain grade C or higher.

Lecture Plan:

Week	Date and Time	Topics	Notes
1	Tba	Chemistry and the environment	
2	Tba	Sources of environmental pollution	
3	Tba	Greenhouse gases (GHGs) and climate changes	Assignment 1 due
4	Tba	Stratospheric ozone depletion	Quiz 1 due
5	Tba	Urban air pollution	Quiz 2 due
6	Tba	Acid deposition	
7	Tba	Soil pollution	Quiz 3 due
8	Tba	Hydrological cycle and availability of drinking water	Quiz 4 due
9	Tba	Freshwater and marine water pollution	
10	Tba	Environmental chemistry of heavy metals	Assignment 4 due
11-14	Tba	Final Project: Environment for Sustainable Development	

Coordinator of ICT Programme

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