

Module XIX: Impact and Application IA

1.1. Module Objectives

On completion of this module, the students will:

- Describe and list of microorganisms are found in the air, terrestrial and aquatic environments, and understand in broad terms the mechanisms microorganisms use to obtain energy for growth and reproduction and how these biochemical processes are linked with geochemical cycling of the elements.
- Describe and define character of bacteria, fungi, protozoa, algae and viruses are and describe roles they play in the geochemical cycling of elements.
- They will be aware of the geochemically and environmentally significant processes that are contributed to by the activities of microorganisms and the environmental factors that control and limit microbial activities. The geochemical roles and importance of heterotrophs and autotrophs will be understood.
- Students will know several methods that are used to identify and enumerate bacteria in natural environments and also how specific microbial activities in the environment can be measured.
- Students will know the strategic approach to use microorganisms as the basic tools of environmental technology.

1.2. Module Data

Person in charge	Ir. V Sri Harjati Suhardi, Ph.D.
Credits	3
Course	BM3103-Environmental Microbiology
Course Examination	Written Test

1.2.1. Sub-module I: Environmental Microbiology

Lecturer	Ir. V Sri Harjati Suhardi, Ph.D.
Semester	3
Type of submodule / course	Compulsory
Credits	3
Workload	3 hours lectures, 3 hours structured activities, 3 hours individual study, 16 weeks per semester, and total 144 hours a semester
Workload Detail	textbook reading assignment, group discussion, presentation, paper review
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written test
Language	Bahasa Indonesia
Course Target / Outcome	This course is designed to introduce students to concepts in microbiology, biochemistry and molecular biology and enable them to translate and apply these concepts within a coherent engineering based framework to the broad areas of

	<p>environmental biotechnology and public health. At the end of this class, students will be able to:</p> <p>A. <u>Conceptual Knowledge and Competence:</u></p> <ul style="list-style-type: none"> - Classify microorganisms according to their morphology, metabolism and phylogeny and characterize principal protagonists that catalyze environmentally significant reactions - Apply microbial growth and metabolism based on energetics and kinetics considerations in applied environmental technology - Formulate cogent approaches to determine the identity, abundance and function of specific microbial populations in complex microbial consortia - Expound on the various interactions between microorganisms, human beings and the environment - Develop optimal engineered strategies to address select pollutants <p>B. <u>Scientific Skills:</u></p> <ul style="list-style-type: none"> - Possess the ability of scientific thinking skill and carry out quantitative and qualitative approaches in communicating and collaborating with various fields to develop microorganism-based environmental technology <p>C. <u>Social Skills:</u></p> <ul style="list-style-type: none"> - Conduct assessments of activities that have a negative impact on the environment in the future and preventive alternatives
Teaching methods	Interactive Lecture and Interactive Laboratory Practices
Contents (SAP)	
	1 Environment microorganisms
	2 Terrestrial microorganisms
	3 Aeromicrobiology
	4 Aquatic microorganisms
	5 Extreme-condition microorganisms
	6 Basic technique used in environment microbiology
	7 Mid-Term Test
	8 Biofilm
	9 Microbial communication, activity, and interaction in environment
	10 Global change and microbial infectious diseases
	11 Microorganisms and treatments of pollutant
	12 Environment quality indicator

13	Microorganisms in wste water treatement
14	Risk assessment
15	
16	Final Test
Literature / Sources	<p>Pepper, I.AL. dan Gerba, C.P. 2015. Environmental Microbiology. Academic Press, USA</p> <p>Ralph Mitchell, Ji-Dong Gu , Environmental Microbiology, Willey – Blackwell, 2010 Pustaka Utama</p> <p>Larry L. Barton, Robert J. C. McLean. 2019. Environmental Microbiology and Microbial Ecology. John Willey and Sons, Inc., USA.</p>