THE MODULE HANDBOOK
DOCTOR BIOLOGY STUDY PROGRAM
FACULTY OF BIOLOGY

SELECTED TOPIC FOR DISSERTATIONS

Environmental Microbiology

Course code	BIDB203165
Course level	Doctoral Program
Semester/ term	Odd/even
Course coordinator	Prof. Dr. Endah Retnaningrum, S.Si., M.Eng.
Lecture(s)	Prof. Dr. Endah Retnaningrum, S.Si., M.Eng. Prof. Dr.Eng. Ir. Wahyu Wilopo S.T., M.Eng., IPM.
Language	Indonesian/English
Classification within the Curriculum	Compulsory
Teaching format/ class hours per week during the semester	This course is planned to have 14 teaching weeks and 2 weeks of examination.
Workload	90 hours
Credits	2-0 credits / 3.6 ECTS
Requirements	Receiving approval from the Supervisory Team.
Program Learning Outcome	CPL 2.1.Upon completing this program, the graduates demonstrate an understanding of of the scientific philosophy of biology which is related in depth to structure, function, diversity, reproduction, evolution and engineering of biological systems. CPL 2.2. After attending this program, graduates demonstrate an understanding of substantial and leading theory in the field of biology/biological resources in order to support education for sustainable development CPL 3.1. After completing this program, the graduates will be able to discover or develop new scientific theories/concepts/ideas in biology
Course Learning Outcome	BIDB203165.1 By the end of this course, students will gain knowledge and understanding of microbial remediation of environmental pollutants. BIDB203165.2 By the end of this course, students will be able to analyze analyze the contribution of microbes to global warming. BIDB203165.3 By the end of this course, students will be able to manage, lead, and develop research on pollutant treatment technologies

	BIDB203165.4 By the end of this course, students will be able to solve human life problems through the application of microbial strains to address environmental issues
Course Description	This course explores microbial activities in environmental biogeochemical cycles, bioremediation, pathogen transmission in the environment, microbial risk assessment, and the treatment and reuse of drinking water. It also addresses key issues such as the contribution of microbes to global warming, the impact of climate change on microbial infectious diseases, the emergence of antibiotic-resistant bacteria, and environmental biotechnology. Additionally, the course covers various environmental microbiology analysis methods, including nucleic acid-based techniques (microarray, phyloarray, real-time PCR, metagenomics, and comparative genomics), as well as physiological methods involving functional genomics and proteomics approaches.
Assessments	The assessment for Selected Topic for Dissertations (Environmental Microbiology) is based on two main components, with the respective criteria and weights: A. Participatory Activity (40%) • Final-Term Exam (30%) • Participation (10%) B. Project (60%) • Stuctured Assigment/Task (10%) • Mid-Term Exam (30%) • Project Result/Case Study/Project Based Learning result (20%)
Study Media and Literature	**Main** 1. Pepper, I., Gerba. C. P., Gentry, T. 2014. Environmental Microbiology. 3rd Edition. Academic Press **Additional** 1. Chen, G., Van Loosdrecht, C, M., Ekama, G. A., Brdjanovic, D. 2020. Biological Wastewater Treatment: Principles, Modelling and Design. IWA Publishing. 2. Pankaj Chowdhary, Abhay Raj, Digvijay Verma, Yusuf Akhter . 2020. Microorganisms for Sustainable Environment and Health. Elsevier.