


MODULE HANDBOOK

	UNIVERSITAS PADJADJARAN FACULTY OF MATHEMATICS AND NATURAL SCIENCES BACHELOR OF BIOLOGY PROGRAMME	COURSE CODE D10D0042
Module designation	Bioremediation of Agro-Industry and Polluted Waters	
Semester(s) in which the module is taught	6	
Person(s) responsible for the module	1. Dr. Nia Rossiana 2. Dr.rer.nat. Tri Dewi K. Pribadi 3. Dr. Suryana	
Medium of instruction	Indonesian	
Relation to curriculum	Elective course	
Teaching methods	Lectures, discussions, cooperative learning, and problem based learning, project based learning	
Workload	Total workload : 8160 minutes = 136 hours Lectures, discussions, : 3 x 50 minutes x 16 weeks = 2400 minutes = 40 hours cooperative learning, and problem based learning : 3 x 60 minutes x 16 weeks = 2880 minutes = 48 hours Exercises : 3 x 60 minutes x 16 weeks = 2880 minutes = 48 hours Self-study	
Credit points	3,00 (5,43 ECTS)	
Required and recommended prerequisites for joining the module	1. Animal Physiology 2. Plant Physiology 3. Microbiology 4. General Ecology	
Module objectives/intended learning outcomes	1. Students are able to explain and demonstrate the scope and basic principles of bioremediation through an introduction to the concept, basic mechanisms, and their application. 2. Students are able to associate environmental damage with its repair using biological agents and their relationship to abiotic parameters. 3. Students are able to determine the characteristics of environmental damage and the restoration of the ecological function of polluted ecosystems, including agro-industries and polluted waters. 4. Students are able to correlate the ecological conditions of polluted environments with the ability of biota to restore ecosystems. 5. Students are able to rationalize solutions and management strategies for polluted ecosystems using bioremediation principles.	
Contents	1. General concepts of bioremediation 2. Scope and limitations 3. Ecosystem restoration laws and regulations 4. Bioremediation mechanisms 5. Various biological agents for bioremediation	

Examination forms	Quiz, midterm exam, assignment, and final exam
Study and examination requirements	The minimum attendance in lectures is 80%. Final grades are evaluated based on quiz (10%), midterm exam (15%), assignment (10%), final exam (15%), project and participation (50%)
Reading lists	<ol style="list-style-type: none"> 1. Crawford, R.L. and Crawford, D. L. 2005. Bioremediation: Principles and Applications. Cambridge: Cambridge University Press. 2. Ramawat, K. G., Merillon, J. M., Arora, J.. (2023). Agricultural Waste: Environmental Impact, Useful Metabolites and Energy Production. Springer. 3. Cassoni, A.C., Gómez-García, R., Pintado, M. (2023). Valorization of Agricultural Lignocellulosic Plant Byproducts Following Biorefinery Approach Toward Circular Bioeconomy. In: Ramawat, K., Méillon, JM., Arora, J. (eds) Agricultural Waste: Environmental Impact, Useful Metabolites and Energy Production. Sustainable Development and Biodiversity, vol 31. Springer, Singapore.