UNDERGRADUATE PROGRAM **MODULE HANDBOOK**

Module designation	Soil Biotechnology (SSOL3052)
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr. Ir. Fikrinda, M.Si.
Language	Indonesian, English
Relation to curriculum	Compulsory module for Soil Science Department
Teaching methods	Lecture, presentation, focus group discussion
Workload (incl. contact hours, self-study hours)	✔ Lecture and discussion 100 minutes per week per semester ✔ Structured tasks 120 minutes per week per semester ✔ Personal tasks 120 minutes per week per semester
Credit points	2 SKS = 3.2 ECTS
Required and recommended prerequisites for joining the module	SSOL1002
Module objectives/intended learning outcomes	✔ Students are able to understand the importance of studying and knowing the developments in soil biotechnology. ✔ Students are able to identify the potential of various soil organisms and their metabolic products in supporting plant productivity and the environment. ✔ Students are able to understand the techniques for creating and applying genetically engineered microorganisms to support crop productivity and the environment.
Content	This course discusses the development of biotechnology in agriculture, particularly in soil, including biopesticides, biofertilizers, and bioconversion. Also studying the use of certain microorganisms and compounds produced by microorganisms that can be used for biological control of plant diseases (biopesticides). Studying techniques for the production/manufacturing of biofertilizers and their application, from isolation to field application, such as mycorrhizae, phosphate-solubilizing microorganisms, nitrogen-fixing microorganisms, and the utilization of earthworms. Additionally, methods for improving contaminated soil through bioremediation are also studied.
Exams and assessment formats	Case method, team based project, quiz, assignment, exam

Study and examination requirements	✔ Case method: 15% ✔ Team based project: 50% ✔ Quiz: 5% ✔ Assignment: 25% ✔ Exam: 5%
Reading list	1. Esser, K (Ed.). 2013. The Mycota. XI. Agricultural Applications. 2nd Edition. Springer. 2. Satyanarayana, T., B. Narain & J.A. Prakash (Eds.). 2012. Microorganisms in Sustainable Agriculture and Biotechnology. Springer. 3. Byrne, P. 2014. Genetically Modified (GM) Crops:Techniques and Applications. Colorado State University 4. Nath Yadav a Kour, D., Kaur, T., Devi, R., Yadav, A., Dikilitas, M., Abdel-Azeem, AM.Amrik , A., dan Saxena, A.K. 2013. 5. Noora Barzkar & Muhammad Sohail. 2020. An overview on marine cellulolytic enzymes and their potential applications. Applied Microbiology and Biotechnology Vol. 104: 6873-6892 6. Ezemagu I.G. , M.I. Ejimofor , M.C. Menkiti, & C. Diyoke. 2021. Biofertilizer production via composting of digestate obtained from anaerobic digestion of post biocoagulation sludge blended with saw dust: Physiochemical characterization and kinetic study. Environmental Challenges 5: 100288 7. Guo, X., L.Yuan, M. Shakeel,Y.Wan, Z. Song, & D.Wang. 2021. Isolation and identification of endophytic fungi with screening of promotion growth on mycorrhizal fungi in blueberry.Rhizosphere 19: 100389.