Module Handbook of Biology of Microorganism

Module designation	The Microorganism Biology course is a course dedicated to students of the study program of Agricultural Microbiology, Department of Agricultural Microbiology, Faculty of Agriculture. It introduces and studies various groups of bacterial microorganisms, archaebacteria, fungi, actinomycetes, yeast and viruses. History and significance, such as cell structure and function, cell activity; nutrition, physiology and metabolism, the introduction of microorganism genetics, and their interactions with the environment and their role in agriculture and industry.
Semester(s) in which the module is taught	Second Semester
Person responsible for the module	Prof. Ir. Sebastian Margino, Ph.D.
Language	Bahasa Indonesia/Indonesian Language
Relation to curriculum	*Compulsory Course*
Teaching methods	Lecture are conducted in the class with 30-40 students. In every meeting, there will be delivered interactive lecture and discussion. In some topics there will be quizzes, individual and/or group assignment. Details: 1. Lectures 2. Assignment (Individual and Group) 3. Discussion 4. Midterm 5. Final Exam 6. Laboratory Work
Workload (incl. contact hours, self-study hours)	- Lectures = 2 SKS x 50 minutes x 16 meetings = 1.600 minutes = 26,67 hours = 26,67 hours/30hours = 0,89 ECTS - Assignment = 2 SKS x 60 minutes x 16 meetings = 1.920 minutes = 32 hours = 32 hours/30hours = 1,07 ECTS - Self Study = 2 SKS x 60 minutes x 16 meetings = 1.920 minutes = 32 hours = 32 hours/30hours = 1,07 ECTS - Practicum = 1 SKS x 170 minutes x 16 meetings = 2.720 minutes = 45,33 hours = 45,33 hours/30hours = 1,51 ECTS Total Workload = 4,54 ECTS
Credit points	*2/1 Credit Points*

Required and recommended prerequisites for joining the module	*None*
Module objectives/intended learning outcomes	*Program Learning Outcomes (PLO):* *PLO1: Able to explain theoretical concepts of biology microorganism and develop microbial-based technology to increase plant production and environmental services.* *PLO2: Able to describe the latest methodology in the field of microbiology to create environmentally friendly and sustainable agricultural development.* *PLO3: Able to select, utilize and manage the potential of microbes and microbiomes to build industrial and agricultural systems.* *Course Learning Outcomes (CLO):* *CLO1: Students can explain about the basics of microorganisms that will then be developed into other areas.* *CLO2: Students have the ability to identify microbes using several methods.* *CLO3: Students can carry out isolation, identification, preservation and analysis of microbial properties.*
Content	1. *Introduction to Microbiology: History & direction of microbiological development (1 meeting)* 2. *Microbial Classification & Characteristics: Hacckel, Whittaker & Woese; Morphological features (1 meeting)* 3. *Microbial cell structure: Basic differences in prokaryotic and eukaryotic cells, cellular and subcellular structures, functions of cell organs, implications, differences in cell structure. (1 meetings)* 4. *Microbial Nutrition: Nutrition and its role in metabolism, microbial groupings based on nutritional needs, nutritional transport. (1 meeting)* 5. *Basics of microbial cell metabolism: Basic concepts of anabolism and catabolism; Enzymatic reactions; Aerobic and anaerobic energy generation; some paths are important in metabolism. (1 meeting)* 6. *Growth of Cell: Growth and growth phases, metabolic and growth relationships, methods of measuring microbial growth, continuous culture and batch culture (2 meetings)* 7. *The Basics of Microbial Genetics: Materials and information; transformation, transduction and conjugation, mutations, extrachromosomal genetic material (1 meetings)* 8. *Microbial Ecology Basics: Natural microbial habitats, influence of environmental factors on microorganisms. (1 meeting)* 9. *Microbiological and Applied Microbiological Interactions: Microbiological interactions with microbes, plants, animals, some cycles of elements in nature and the role of microbiology in them, soil and environment applied microbiology. (1 meeting)* 10. *Student Seminar (3 meetings)*
Examination forms	*Hogh Order Thinking Skills Examination*
Study and examination requirements	*To be able to take the final exams, the minimum of student attendance is 70% out of effective meetings. From 14 meetings, students must take a minimum of 10 meetings to take the exam.*

Reading list	*Main References:* 1. *Madigan, M.T., Martinko, J.M. and J. Parker. 2003. Brock Biology of Microorganisms. 8th edt. Prentice Hall International, Inc. USA.* 2. *Stolp, H. 1998. Microbial Ecology: Organism, Habitat and Activities. Cambridge University. Cambridge.* 3. *Atlas, R.M. and R. Bartha. 1997. Microbial Ecology. Fundamentals and Apllications. The Benyamin/ Cunnings Publishing Company, Inc. California.* 4. *Stanier Deudoroff. 1996. Microbial World. Prentice Hall International, Inc. USA.* 5. *Presscot, L.M., L.P. Harley and D.A. Klein. 2000. Microbiology. 2nd, Edt. Wm. C. Brown Publisher Oxford England.* 6. *Perry, J.J. and J.T. Staley. 1997. Microbiology: Dynamics and Diversity. Saunders College Publishing. Tokyo.* 7. *Crown, K.M., and J.T. Staley. 2006. Microbiology. Dynamics and Diversity.* 8. *Gabi Nindl Waite & Lee R. Waite, 2007. Applied Cell and Moleculer Biology for Engineers. The Mc. Graw Hill Comp. Inc. New York.* *Additional References:* *1. Reference scientific journal on the biology of microorganisms* *2. Guidebook for the Biological Practice of Microorganisms*