## Module Handbook of Microbial Systematic and Taxonomy

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| Module designation | This course is intended for students from the Agricultural Microbiology study program, Faculty of Agriculture. It studied the division of three groups (kingdom) of living bodies (bacteria, archaea, and eukaryotes). Topics to be discussed in this course include metabolism, adaptation, microbial characteristics, both morphology, physiology, and molecular analysis, and methods of phylogenetic analysis. |
| Semester(s) in which the module is taught | Third Semester |
| Person responsible for the module | Ir. Ngadiman, M.Si., 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.<br><br>Details:<br>1. Lectures<br>2. Assignment (Individual and Group)<br>3. Discussion<br>4. Midterm<br>5. Final Exam<br>6. Laboratory Work |
| Workload (incl. contact hours, self-study hours) | - Lectures = 2 SKS x 50 minutes x 16 meetings = 1.600 minutes<br>= 26,67 hours<br>= 26,67 hours/30hours<br>= 0,89 ECTS<br>- Assignment = 2 SKS x 60 minutes x 16 meetings = 1.920 minutes<br>= 32 hours<br>= 32 hours/30hours<br>= 1,07 ECTS<br>- Self Study = 2 SKS x 60 minutes x 16 meetings = 1.920 minutes<br>= 32 hours<br>= 32 hours/30hours<br>= 1,07 ECTS<br>- Practicum = 1 SKS x 170 minutes x 16 meetings = 2.720 minutes<br>= 45,33 hours<br>= 45,33 hours/30hours<br>= 1,51 ECTS<br>Total Workload = 4,54 ECTS |
| Credit points | *2/1 Credit Points* |
| Required and recommended prerequisites for joining the module | *Biology of Microorganism* |

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| Module objectives/intended learning outcomes | *Program Learning Outcomes (PLO):*<br>*PLO1: Able to apply logical, critical, systematic, and innovative thinking by utilizing the technology of information to produce solutions according to the field of expertise with integrity and embodied in scientific documents.*<br>*PLO2: Able to describe the latest methodology in the field of microbiology to create environmentally friendly and sustainable agricultural development.*<br>*PLO3: Able to create, retrieve and present data obtained in research, and able to utilize biological data banks.*<br><br>*Course Learning Outcomes (CLO):*<br>*CLO1: Students are able to explain the systematics and taxonomy of microbes and their role for microorganisms in industry.*<br>*CLO2: Students are able to describe microbial diversity based on morphology, physiology, ecology, serology and molecularly.*<br>*CLO3: Students are able to explain the history of microbial classification, types of classification, each microbial classification, how to create dendograms and phylogenetic trees, as well as using websites for microbial nomenclature.* |
| Content | 1. *Introduction: Course contracts, understanding of systematics & taxonomy, history, scope, and purpose of microbial taxonomy (1 meeting)*<br>2. *Characterization: Morphological, physiological, and ecological diversity, microbial serology, microbial serology, molecular diversity based on DNA and RNA molecules, molecular diversity based on protein, lipids, etc. (3 meetings)*<br>3. *Classification: History, phenetic and phylogenetic classification, numerical taxonomy. (1 meeting)*<br>4. *Nomenclature: The preparation of dendrograms, phylogenetic trees, computer analysis (software) and the use of websites for microbial nomenclature Microbiome are useful. (1 meeting)*<br>5. *Bacterial Classification (1 meetings)*<br>6. *Classification of Actinomycetes (1 meeting)*<br>7. *Classification of Fungi (1 meeting)*<br>8. *Classification of Yeast (1 meeting)*<br>9. *Classification of Virus (1 meeting)*<br>10. *Students Seminar (2 meetings)*<br>11. *Materials Review (1 meeting)* |
| Examination forms | *High 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:*<br>*Books and journals Related to microbial systematic and taxonomy*<br><br>*Additional References:*<br>1. *Microbial Systematics and Taxonomy Practical Book*<br>2. *Interactive video about microbial taxonomy analysis tools on YouTube* |