THE MODULE HANDBOOK
FACULTY OF BIOLOGY

Microbial Systematics

Module code	BIO 50502
Module level	3rd year of Undergraduate Program in Biology
Abbreviation, if applicable	-
Sub-heading, if applicable	-
Courses included in the module, if applicable	-
Semester/term	Even
Module coordinator(s)	Prof. Drs. Langkah Sembiring, M.Sc., Ph.D.
Lecture(s)	1. Prof. Drs. Langkah Sembiring, M.Sc., Ph.D. 2. Dr. Endang Retnaningrum, S.Si., M,Eng. 3. Abdul Rahman Siregar, S.Si., M. Biotech. 4. Sari Darmasiwi, S.Si., M. Biotech.
Language	Indonesia
Classification within the Curriculum	Compulsory
Teaching format/class hours per week during the semester	This course is organized into 2 classess and planned to have 14 teaching weeks and 2 weeks of examination.
Workload	Estimated working hour: 14 hours/week.
Credit points	3-1 credits
Requirements	Biochemistry (BIO 30101); Microbiology (BIO 40501); Technical Biochemistry (BIO 40102)
Learning goals/ competencies	**1. Knowledge and understanding** a. Basic theory and instrumentation for conducting research on microbial systematics. b. Biological phenomenon at various level and able to describe the relevance of the theory of evolution related with microbial diversity. c. The fundamentals theory and practical of microbial systematics and the strengthening concept of the microbial classification development, both traditional, phenetic, and phylogenetic classification in microbes identification. **2. Ability/intellectual skill** a. Planning, implementing, and reporting research in the field of Microbiology and Microbial systematics.

	b. Formulating and testing hypotheses in the field of Microbiology and Microbial systematics. c. Evaluating and integrating data and taxonomical information from various resources. d. Conducting a holistic approach in order to resolve microbial diversity problems in related to the environment, agriculture, industry, and health. **3. Practical skill** a. Planning and implementing research on microbial diversity validly. b. Utilizing laboratory instrumentations to produce microbial taxonomical data both in chemicals, molecular, and cellular. c. Analyzing the taxonomical research data and determining the validity. d. Using all scientific information resources to solve problems in microbial diversity research. e. Classifying and identifying important microbes for various fields. f. Publishing scientific report both in orally and written. **4. Managerial and transferable skill** a. Able to communicate effectively in Bahasa Indonesia and English both oral and written. b. Able to work both in group and independently c. To integrate the branch of Biology in order to solve problems in study of microbial diversity. d. Using Information and Communication Technology (ICT) in order to study independently and professional development and career. **5. Attitude** a. Able to anticipate and to resolve any issues which are related to the field of microbiology and microbial diversity in society b. High curiosity. c. Respecting the intellectual ownership rights in the form of ideas, concepts, and inventions of others d. Appreciating the resolving problems efforts interdisciplinary in exploring, exploiting and preserving microbial resources . e. Easy to adapt to the new environment and appreciate the differences in the views and opinions of others
Content	Microbial Systematics is designed to prepare students with the opportunity to deal with some principles of microbial diversity and the relationship between each other, both on phenetic and phylogenetic similarity. Considering that microbial systematics is a study to

explore microbial diversity, this subject plays important roles to generate useful information about microbes. Nowadays, field study of microbial systematics has undergone a revolutionary transformation due to chemicals and molecular methods and the enhancement of computerized data processing. The development of this area has changed significantly on the approach for microbes classification and identification, especially for bacteria. As a result, a modern microbial systematics has been able to apply to address challenges on biotechnology through generating high quality database to be used in improving quality of microbial classification and identification and creating strategic formulation in invention a novel important microbes for biotechnology. In addition, microbial systematics can also provide information about microbial diversity to support microbial ecology studiesresulting rapid detection system for targeted useful microbes in environment, health, agriculture, and industry. Microbial Systematics (BIO 50502) is designed to introduce microbial diversity including bakteria, archaea, fungi, and prototists. The topics will be delivered in speech supporting with power point presentation, and refer to student centre learning process through collaboration and cooperative activity, and based on problem based learning through deliverying personally and group assignment. This lecture will be run to delivere the understanding of bassic concept by implementing **student centered learning**- **STAR** method enriched with both completed and ongoing research. **Student centred assignments**, including data browsing from electronic informaion devices to be presented in class, so that students are forced to develop knowledge, skills (subject skills) and competence. In order to increase knowledge and skills in dealing with the characterization and classification various types of microbes, students are required to do some practical working in laboratory for 1 credit. **Student centred practical working** (practical skills), contains introduction to bassic technique of characterization, classification, and identification various types of microbes using principals of numerical fenetic taxonomy. The subject aims to:

a. Introduce sophisticated concept of classification, nomenclature, and microbial identification.
b. Describe the role of microbial systematics in life sciences.
c. Describe the scope and the importance of microbial systematics.
d. Emphasize the importance of software and biological database in microbial systematics.
e. Introduce the representatives taxon of important microbes for agriculture, environment, and health.

Study/ exam achievements	1. Theory a. Midterm: 30% b. Final examination: 60% c. Short quiz and assignment: 10% 2. Laboratory work a. General test: 20% b. Pretest: 20% c. Report: 20% d. Attitude: 10% e. Laboratory work examination: 40%
Forms of media	White board, LCD, notebook, video and animation, and specimen.
Literature	**Compulsory** 1. Goodfellow, M. 2000. Microbial Systematics: Backgorund and Uses. In Applied Microbial Systematics (F.G. Priest & M. Goodfellow, Eds.). Kluwer Academic Publisher. 2. Stackebrandt, E., Tindall, B., Ludwig, W. & Goodfellow, M. 1999. Prokaryotic Diversity and Systematics. In Biology of The Prokaryotes (J.W. Langeler, G. Drews & H.G. Schlegel, Eds.), Blackwell Science, Thieme Stuttgart, New York. 3. Logan, N.A. 1994. Bacterial Systematics. Blackwell Scientific Publications. Oxford. UK **Additional** 4. Goodfellow, M. & O'Donnel, A.G. (Eds.). 1993. Handbook of New Bacterial Systematics. Academic Press, Harcourt Brace & Company Publisher, London. 5. Kirshop, A.E. & Doyle, A. (Eds.). 1991. Maintenance of Microorganisms and Cultured Cells: A Manual of Laboratory Methods. Academic Press, Harcourt Brace Jovanovich Publisher, London. Sneath, P.H.A. (Ed). 1992. International Code of Nomenclature of Bacteria. 1990. Revision. The American Society for Microbiology, Washington D.C.