

|                                                       |                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module designation                                    | Microbiology                                                                                                                                                                                                                                                                                                     |
| Module level, if applicable                           | Undergraduate                                                                                                                                                                                                                                                                                                    |
| Code, if applicable                                   | PBIOUM6124                                                                                                                                                                                                                                                                                                       |
| Subtitle, if applicable                               | -                                                                                                                                                                                                                                                                                                                |
| Courses, if applicable                                | -                                                                                                                                                                                                                                                                                                                |
| Semester(s) in which the module is taught             | Odd semester                                                                                                                                                                                                                                                                                                     |
| Person responsible for the module                     | Prof. Dr. Dra. Utami Sri Hastuti, M.Pd                                                                                                                                                                                                                                                                           |
| Lecturer                                              | Prof. Dr. Dra. Utami Sri Hastuti, M.Pd<br>Sitoresmi Prabaningtyas, S.Si., M.Si<br>Agung Witjoro, S.Pd, M.Kes<br>Fauzi Akhbar Anugrah, S.Si., M.Si.<br>Muhammad Andry Prio Utomo, S.Si., M.Si.                                                                                                                    |
| Language                                              | Bahasa Indonesia                                                                                                                                                                                                                                                                                                 |
| Relation to curriculum                                | Undergraduate degree program, compulsory, 3rd semester.                                                                                                                                                                                                                                                          |
| Type of teaching, contact hours                       | Undergraduate degree program: cooperative learning, presentation, laboratory work, 2 x 50 = 100 minutes and 1 x 170 minutes                                                                                                                                                                                      |
| Workload                                              | 1. Lectures: 2 x 50 = 100 minutes (1.67 hours) per week.<br>2. Exercises and Assignments: 2 x 60 = 120 minutes (2 hours) per week.<br>3. Laboratory work: 1 x 170 minutes (2.83 hours) per week.<br>Private study: 2 x 60 = 120 minutes (2 hours) per week.                                                      |
| Credit points                                         | 3 Credit points (~5 ECTS-eq)                                                                                                                                                                                                                                                                                     |
| Requirements according to the examination regulations | A student must have attended at least 80% of the lectures to sit in the exams.                                                                                                                                                                                                                                   |
| Recommended prerequisites                             | - (Cell Biology)<br>- (Protists)                                                                                                                                                                                                                                                                                 |
| Module objectives/intended learning outcomes          | Students are able to:<br>(LO3) Master the basic concepts of science and scientific procedures, as well as look for and analyze problems or phenomena in the field of science with a science and technology approach which is carried out carefully, critically, systematically, so as to protect God's creation. |

|                          |                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                               |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Course learning outcomes | <ul style="list-style-type: none"> <li>● Understanding concepts in Microbiology</li> <li>● Understanding the nature and role of microbes in everyday life.</li> <li>● Understanding the application of Microbiology concepts in everyday life.</li> <li>● Mastering basic laboratory techniques and procedures for studying microbes.</li> </ul> |                                                                                                                                                               |
| Content                  | <ul style="list-style-type: none"> <li>● Concepts in Microbiology</li> <li>● The nature and role of microbes in everyday life.</li> <li>● Application of Microbiology concepts in everyday life.</li> <li>● Basic laboratory techniques and procedures for studying microbes</li> </ul>                                                          |                                                                                                                                                               |
| Learning activity        | Week 1                                                                                                                                                                                                                                                                                                                                           | Theory: Introduction to microorganisms and their role in the environment<br>Lab Practice: Measuring the ocular micrometer scale and measuring bacterial cells |
|                          | Week 2                                                                                                                                                                                                                                                                                                                                           | Theory: Media and media sterilization<br>Lab Practice: Preparation of nutrient broth and nutrient agar media                                                  |
|                          | Week 3                                                                                                                                                                                                                                                                                                                                           | Theory: Bacterial morphology and cytology<br>Lab Practice: Microbial capture, observation of bacterial colony morphology and Gram staining                    |
|                          | Week 4                                                                                                                                                                                                                                                                                                                                           | Theory: Bacterial staining and examination<br>Lab Practice: Observation of bacterial movement and staining of bacterial capsule                               |
|                          | Week 5                                                                                                                                                                                                                                                                                                                                           | Theory: Effect of environment on microbes and lichens<br>Lab Practice: Bacterial spore staining and bacterial respiration                                     |
|                          | Week 6                                                                                                                                                                                                                                                                                                                                           | Theory: Bacterial propagation and growth and microbial metabolism<br>Lab Practice: Inspection of molds for contaminants in food                               |
|                          | Week 7                                                                                                                                                                                                                                                                                                                                           | MIDTERM EXAMINATION<br>Theory and Lab Practice                                                                                                                |
|                          | Week 8                                                                                                                                                                                                                                                                                                                                           | Theory: Fungus<br>Lab Practice: Microbiological quality test of food ingredients based on bacterial ALT                                                       |
|                          | Week 9                                                                                                                                                                                                                                                                                                                                           | Theory: Viruses and microbial genetics<br>Lab Practice: Water microbiological quality test based on MPN coliform                                              |
|                          | Week 10                                                                                                                                                                                                                                                                                                                                          | Theory: Immunology and the normal flora of the human body<br>Lab Practice: Bacterial metabolism test                                                          |
|                          | Week 11                                                                                                                                                                                                                                                                                                                                          | Theory: How to enter microbes in the human body<br>Lab Practice: Effect of temperature on bacterial growth                                                    |

|                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                              |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                             | Week 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Theory: Alternative solutions to overcome the contamination of coliform bacteria in drinking water<br>Lab Practice: Nata de coco fermentation technique and observation of microbial cells in fermented food |
|                                                             | Week 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Theory: Microbes in water and microbes that cause disease in plants<br>Lab Practice: Making tempeh with variations of aeration and yogurt fermentation techniques                                            |
|                                                             | Week 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Theory: Health microbiology and microbes in foodstuffs<br>Lab Practice: Antibacterial test of several antiseptics                                                                                            |
|                                                             | Week 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Theory: Microbes in processed foods and environmental microbiology<br>Lab Practice: Antagonism test between microbes                                                                                         |
|                                                             | Week 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | FINAL EXAMINATION<br>Theory and Lab Practice                                                                                                                                                                 |
| Study and examination requirements and forms of examination | PBL: 10 %<br>PjBL: 50%<br>Midterm test theory: 5%<br>Midterm test practice: 5%<br>Final test theory: 10%<br>Final test practice: 10%<br>Makalah: 5%<br>Presentasi 5%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                              |
| Media employed                                              | LCD, board, Sipejar, WA Group.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                              |
| Reading list                                                | <ol style="list-style-type: none"> <li>1. Cappuccino, I.G., and Sherman, N. 1982. Microbiology : A. Laboratory Manual. Sydney : Addison-Wesley Publishing Company.</li> <li>2. Dwidjoseputro, D. 1984. Dasar-Dasar Mikrobiologi. Jakarta : Djambatan.</li> <li>3. Fardiaz, S.1989. Penuntun Praktek Mikrobiologi Pangan. Bogor : Penerbit IPB.</li> <li>4. Hadioetomo, R.S. 1985. Mikrobiologi Dasar dalam Praktek. Jakarta : PT. Gramedia.</li> <li>5. Hastuti, Utami Sri. 2012. Petunjuk Kegiatan Praktikum Mikrobiologi. Malang: UMM Press.</li> <li>6. Tortora, Gerard J, Bordelle R Funke, and Christine L. Café. 2004. Microbiology – an Introduction. San Fransisco : Pearson Education, Inc.</li> </ol> |                                                                                                                                                                                                              |
| Date of last amendment made                                 | January, 2022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                              |