



## Module Description Industrial Microbiology

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| Module designation                                            | Industrial Microbiology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Module code                                                   | 23G03121402                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Semester(s) in which the module is taught                     | 4 <sup>th</sup> semester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Person responsible for the module (lecturers)                 | ❖ Prof. Dr. Ir. Amran, M.Si.<br>❖ Dr. Fitri, S.TP.<br>❖ Muhpidah, S.TP., M.Si                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Language                                                      | Indonesian language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Relation to curriculum                                        | Compulsory course                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Teaching methods                                              | Lecture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Workload                                                      | Total workload (estimated):<br>❖ 27 hours of lecture<br>❖ 32 hours of exercise<br>❖ 32 hours of independent study                                                                                                                                                                                                                                                                                                                                                                                          |
| Credit points                                                 | 2 credit points = 3.24 ECTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Required and recommended prerequisites for joining the module |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Module objectives/ Intended Learning Outcomes (ILO)           | ILO 6. Identifies microorganisms in food ingredients and processed foods, including applications in biotechnology (C3)                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                               | CLO 1. Able to conceptually apply the selection and growth process of industrial microbiology<br>CLO 2. Able to conceptually apply microbial applications in various industries                                                                                                                                                                                                                                                                                                                            |
| Content                                                       | ❖ Scope and types of industrial microbes, introduction to the use of microbiology in industry, metabolic pathways for product biosynthesis in industrial microbiology<br>❖ Prerequisites for microbes in industry, use of microbes in the bioenergy industry (bioethanol, biodiesel)<br>❖ Sterility and disinfection in industrial microbiology, as well as understanding the application of microbiology in environment<br>❖ Applications of microbiology in the healthcare and pharmaceutical industries |



|                                    | <ul style="list-style-type: none"><li>❖ Microbiology applications in the food industry (polysaccharides extracellular), and biochemical industry (organic acids)</li><li>❖ Applications of microbiology in the cosmetics industry, development of microbiology in industry</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
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| Examination form                   | Writing (essay)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| Study and examination requirements | <p>Examination requirements: Attendance above 80%</p> <ul style="list-style-type: none"><li>❖ Individual assignments: 25%</li><li>❖ Problem based learning: 65%</li><li>❖ Quiz: 10%</li></ul> <p>Grading:</p> <table><tr><th>Numerical range</th><th>Letter grade</th><th>Conversion value</th></tr><tr><td>85 - 100</td><td>A</td><td>4.00</td></tr><tr><td>80 - &lt; 85</td><td>A-</td><td>3.75</td></tr><tr><td>75 - &lt; 80</td><td>B+</td><td>3.50</td></tr><tr><td>70 - &lt; 75</td><td>B</td><td>3.00</td></tr><tr><td>65 - &lt; 70</td><td>B-</td><td>2.75</td></tr><tr><td>60 - &lt; 65</td><td>C+</td><td>2.50</td></tr><tr><td>50 - &lt; 60</td><td>C</td><td>2.00</td></tr><tr><td>40 - &lt; 50</td><td>D</td><td>1.00</td></tr><tr><td>&lt; 40</td><td>E</td><td>0.00</td></tr></table> <p><i>If student(s) receives(s) a score below 40, student(s) must retake the course</i></p> | Numerical range  | Letter grade | Conversion value | 85 - 100 | A | 4.00 | 80 - < 85 | A- | 3.75 | 75 - < 80 | B+ | 3.50 | 70 - < 75 | B | 3.00 | 65 - < 70 | B- | 2.75 | 60 - < 65 | C+ | 2.50 | 50 - < 60 | C | 2.00 | 40 - < 50 | D | 1.00 | < 40 | E | 0.00 |
| Numerical range                    | Letter grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Conversion value |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 85 - 100                           | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4.00             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 80 - < 85                          | A-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3.75             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 75 - < 80                          | B+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3.50             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 70 - < 75                          | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3.00             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 65 - < 70                          | B-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2.75             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 60 - < 65                          | C+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2.50             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 50 - < 60                          | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2.00             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| 40 - < 50                          | D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1.00             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| < 40                               | E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.00             |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| Reading list                       | <ol style="list-style-type: none"><li>1. Industrial Microbiology: An Introduction by: Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton</li><li>2. Modern Industrial Microbiology and Biotechnology by: Nduka Okafor</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |
| Date of last amendment             | 9 January 2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |              |                  |          |   |      |           |    |      |           |    |      |           |   |      |           |    |      |           |    |      |           |   |      |           |   |      |      |   |      |