

1. Module XVII: Techniques in Microbiology I

1.1. Module Objectives

On completion of this module, the students will:

- Able to assess in team to create and distribute the fermented product which are safe and useful for people
- Able to describe the suitable variation of methods in classic and molecular microbiology with the principal in microbial detection, isolation, enumeration, cultivation, and preservation
- Able to combine and summarise the microbiology analysis results with its existing basic standard
- Able to apply techniques in fermentation process (bioprocess) so that it can be used to construct the efficiency process
- Able to apply microbial fermentation technique in laboratory scale and able to assess its supply in bigger scale
- Able to isolate, screen, and cultivate the microorganisms that will be used in fermentation process
- Able to assess the standardisation fermentation product by applied fermentation techniques in microbiology

1.2. Module Data

Person in charge	Dr. Isty A. Purwasena
Credits	7
Course	BM3202 Analytical Microbiology BM3203 Principle of fermentation technology
Modules Examination	written test

1.2.1. Sub-module I: Analytic microbiology

Lecturer	Dr. Pingkan Aditiawati
Semester	6
Type of submodule / course	Compulsory
Credits	3 (1)
Workload – Class Lecture	2 hours lectures, 3 hours laboratory, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 144 hours a semester
Workload Detail	Laboratory work, group discussion, presentation, paper review, small exhibition

Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of assessment/examination	Written Test : Midterm exam, Assignments Presentation Project : Fermentation
Language	Bahasa Indonesia
Course Target / Outcome	<ol style="list-style-type: none"> 1. Students will be able to properly describe various classical and molecular methods of microbiology, which can be used to detect, enumerate, cultivate and preserve microorganisms 2. Students will be able to report results of microbial analysis, regarding to the general principles 3. Students will be able to standardize fermentation products by implementing fermentation techniques in microbiology 4. Students will be able to work in a team to produce and market safe fermentation products that is enjoyed by people
Teaching methods	Lecture, presentation, laboratory teaching
Contents (weekly)	
	1 Introduction
	2 Sampling techniques
	3 Isolation techniques
	4 Cultivation and enumeration techniques
	5 Microbial identification
	6 Nucleid acid based methods of analysis
	7 Techniques in Microbiological Assay
	8 Mid-Term Test
	9 Microbial indicator for analysis
	10 AMES test
	11 Immunological analysis
	12 Food Microbiological assay based on international standard
	13 Microbiological Analysis of Water
	14 Presentation
	15
	16 Final test

Literature / Sources	Maier R.M., Pepper I.A., Gerba C.P., 2009. Environmental Microbiology, Elsevier Inc. USA Jay J.M., Loessner J.M., Golden D.A. 2005, Modern Food Microbiology, Springer Science + business media, USA Dart, R.K. 1996, Microbiology for the Analytical Chemist, The Royal Society of Chemistry, UK.
Other specialties	

1.2.2. Sub-module II: Principles of Fermentation Technology

Lecturer	Dr. Dea Indriani Astuti
Semester	6
Type of submodule / course	Compulsory
Credits	4 (2)
Workload – Class Lecture	2 hours lectures, 6 hours laboratory, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 192 hours a semester
Workload Detail	Laboratory work, group discussion, presentation, paper review, small exhibition
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of assessment/examination	Written Test : Midterm exam, Final exam, Assignments Presentation
Language	Bahasa Indonesia
Course Target / Outcome	<ol style="list-style-type: none"> 1. Students will be able to implement microbial techniques to the process of fermentation (bioprocess) and calculate its efficiency 2. Students will be able to master techniques in fermentation by using microorganisms in a laboratory scale, and describe the process of multiplication into a larger scale 3. Students will be able to filter, screen and store microorganisms to be used in fermentation processes
Teaching methods	Interactive Laboratory Practices
Contents (weekly)	
	1 Introduction
	2 Isolation and filtering of industrial microorganisms, and maintenance of microorganisms
	3 Storage and multiplication of microorganisms
	4
	5 Growth kinetics and product formation

6	Fermentation Media
7	
8	Mid-Term Test
9	Sterilization
10	Development of Inoculum for industrial fermentation
11	Separation and purification of fermentation product
12	Processing fermentation waste
13	Student presentation
14	
15	
16	Final Test
Literature / Sources	<ol style="list-style-type: none"> 1. Stanbury, P.F., A. Whitaker., S.J. Hall. 2003. Principles of Fermentation Technology, 2nd ed. Elsevier Science Ltd. 2. McNeil, B., and L.M. Harvey. 1990. Fermentation a practical approach. IRL Press, USA. 3. Demain, A. L. and Davies, J. E. 1999. Manual of Industrial Microbiology and Biotechnology, 2nd ed. ASM Press, USA 4. Wang, D. I. C. : Cooney, C. L.; Demain A. L.; Dunhill, P.: Humbrey, A. E. & M. D. Lilly. 1979. Fermentation and Enzyme Tehnology. John Wiley & Sons, New York.
Other specialties	

