

## Module XXVIII: Impact and Application IIB

### 1.1. Module Objectives

On completion of this module, the students will be able to:

- Understand the national and international regulations safety of cosmetic products, understand international cosmetics microbiology tests standards (microbiological testing) and understand the basic technology in making cosmetics
- Understand the process of making cosmetics and regulations (product safety)
- Understand the biodiversity of thermophilic microorganisms
- Understand the peculiarities in terms of physiological adaptation to extreme environmental conditions
- Students obtain concept about the potential of biotechnology from thermophilic microorganisms
- Students possess competence to connect the application of various characteristics and characteristics of microorganisms that live in extreme environments
- Understand the role of microorganisms in various industries and the development of production processes in a microorganism-based bioindustry
- Understand applied microorganism-based industrial processes in small industries (entrepreneurship) and large industries

### 1.2. Module Data

Person in charge	Neil, Priharto, MT
Credits	5
Courses	BM 4102 Cosmetic Microbiology
	BM 4103 Extreme-thermophilic microbiology
	BM 4106 Kapita Selektta of Applied microbiology
	BM 4202 Petroleum Microbiology
	BM 4206 Microbial-based energy
Module examination	Written test

#### 1.2.1. Sub-module I: Cosmetic Microbiology

Lecturer	Dr. Dea Indriani Astuti
Semester	7
Type of submodule / course	Elective
Credits	2
Workload - class lecture (hr/sem)	2 hours lectures, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 96 hours a semester
Workload details	Textbook reading assignment, group discussion, paper review, presentation
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written
Language	Bahasa Indonesia

Course Target / Outcome	<p>After completing the course, student will be able to understand microbiology problems in cosmetics world and understand how to control microorganisms to produce qualified cosmetics.</p> <p>A. <u>Conceptual Knowledge and Competence:</u></p> <ul style="list-style-type: none"> <li>- Understand the national and international regulations safety of cosmetic products, understand international cosmetics microbiology tests standards (microbiological testing) and understand the basic technology in making cosmetics</li> <li>- Understand the process of making cosmetics and regulations (product safety)</li> </ul> <p>B. <u>Scientific Skills:</u></p> <ul style="list-style-type: none"> <li>- Think scientifically in quantitative and qualitative data regarding applied microbiology in the cosmetics world; Able to work in teams and communicate well in groups.</li> </ul>
Teaching methods	Interactive Teaching
Contents (SAP)	
1	Introduction of cosmetic microbiology
2	Basic principal of cosmetic microbiology
3	Sanitation in cosmetic microbiology
4	Assay in cosmetic microbiology
5	Assay in cosmetic microbiology
6	Cosmetic preservation
7	Mid-Term Test
8	Free additive compound products
9	Toxicology in cosmetic preservation
10	Microflora in Skin
11	Cosmetic technology
12	Cosmetic technology
13	Persentation
14	Persentation
15	Future deveolpment of cosmetic microbiology
16	Final Test
Literature / Sources	
Other specialties	<ul style="list-style-type: none"> <li>• Geis, P.A. 2006. Cosmetic Microbiology: A Practical Approach. CRC Press.</li> <li>• Orth, D. 2009. Insights into Cosmetic Microbiology. Allured Pub. Corp.</li> </ul>

	<ul style="list-style-type: none"> <li>• Elsner.P.,Maibach.H.I., (2000), “Cosmeceuticals, Drug vs Cosmetics”, Marcel Dekker, New York ,Basel</li> <li>• Linda D. Rhein et al, (2007) Surfactans in Personal care Products and Decorative Cosm2tics , CC Press</li> </ul>
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### 1.2.2. Sub-module II: Extreme-thermophilic microbiology

Lecturer	Prof. Dr. Pingkan Aditawati, Prof. Akhmaloka, PhD
Semester	7
Type of submodule / course	Elective
Credits	2
Workload - class lecture (hr/sem)	2 hours lectures, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 96 hours a semester
Workload details	Textbook reading assignment, group discussion, paper review, presentation
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written
Language	Bahasa Indonesia
Course Target / Outcome	<p>A. <u>Conceptual Knowledge and Competence:</u></p> <ul style="list-style-type: none"> <li>- Understand the biodiversity of thermophilic microorganisms</li> <li>- Understand the peculiarities in terms of physiological adaptation to extreme environmental conditions</li> <li>- Students obtain concept about the potential of biotechnology from thermophilic microorganisms</li> <li>- Students possess competence to connect the application of various characteristics and characteristics of microorganisms that live in extreme environments</li> </ul> <p>B. <u>Scientific Skills:</u></p> <ul style="list-style-type: none"> <li>- Possess the ability of scientific thinking skill and understand the quantitative and qualitative data related to physiological activity of microorganisms</li> <li>- Demonstrate working and communication attitude effectively in team.</li> </ul>
Teaching methods	Interactive Teaching
Contents (SAP)	
	Introduction of microbiology in extreme condition, classification and taxonomy of extreme-thermophile microorganisms

2	Isolation and cultivation of extreme-thermophile microorganisms
3	Psicrophile
4	Thermophile
5	Piezophile
6	Asidophile
7	Mid-Term Test
8	Alkalophhile
9	Methanogen
10	Overview energy forming reaction in extreme-thermophile microorganisms
11	Cell wall and membrane, <i>proton motive force</i> and transport system of extreme-thermophile microorganisms
12	Protein stability and activity in extreme temperature, pressure, and water activity
13	Nucleic acid stability and topology in hiperthermophile
14	Small molecules (coenzim, substrate) stability in high temperature
15	Biotechnology exploration
16	Final Test
Literature / Sources	<ul style="list-style-type: none"> <li>• Horikoshi, K and Grant, W.D. Extremophiles: microbial life in extreme environments. 1st edition. New York: John Wiley &amp; Sons. 1998</li> <li>• Gerday, C. and Nicolas Glansdorff. Physiology and Biochemistry of Extremophiles. 1st edition. Washington, D.C.: ASM Press. 2000</li> <li>• Cavicchioli, Ricardo. Archaea, Molecular and Cellular Biology. 1st edition. Washington, D.C.:ASM Press. 2007</li> <li>• Madigan, Michael T. Brock Biology of Microorganisms. 13th Edition. Prentice Hall, Pearson Education International. 2010</li> </ul>
Other specialties	

▪ **Sub-module III: Kapita Selektta of Applied microbiology**

Lecturer	Dr. Dea Indriani Astuti; Dr. Intan Taufik
Semester	6/7
Type of submodule / course	Elective
Credits	2
Workload	2 hours lectures, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 96 hours a semester

Workload Detail	textbook reading assignment, group discussion, presentation, paper review
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written test
Language	Indonesia
Course Target / Outcome	<ul style="list-style-type: none"> <li>- Understand the role of microorganisms in various industries and the development of production processes in a microorganism-based bioindustry</li> <li>- Understand applied microorganism-based industrial processes in small industries (entrepreneurship) and large industries</li> </ul>
Teaching methods	Interactive Lecture
Contents (SAP)	
	1 History of microbial industry development
	2 Scope of microbial industry
	3 Microorganism agent in microbial industry
	4 Source substrat in microbial industry
	5 Fermentation
	6 Downstream processing in microbial industry
	7 Mid-term Test
	8 Biomass product
	9 Metabolic product
	10 Microorganisms in mining industry
	11 Microorgansms in waste treatment
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	15
	16 Final Test
Literature / Sources	<p>Malik, V. S., P. Sridhar, M. C. Sharma &amp; H. Polasa, 1992, Industrial Biotechnology, Oxford &amp; IBH Publishing Co. PVT. LTD. New Delhi</p> <p>Michael L. Shuler, F. Kargi. 1992. Bioprocess Engineering. Prentice Hall Inc.</p> <p>Waites, M.J., Morgan N.L., Rockey, J.S. dan Higton, G. 2001. Industrial Microbiology: An Introduction. Blackwell Science</p>

### 1.2.3. Sub-module IV: Petroleum Microbiology

Lecturer	Dr. Dea Indriani Astuti; Dr. Eng. Isty Adhitya Purwasena
Semester	8
Type of submodule / course	Elective

Credits	2
Workload - class lecture (hr/sem)	2 hours lectures, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 96 hours a semester
Workload details	Textbook reading assignment, group discussion, paper review, presentation
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written
Language	Bahasa Indonesia
Course Target / Outcome	<ul style="list-style-type: none"> <li>- Understand the basics of microbiology about the growth of microorganisms in hydrocarbon systems</li> <li>- Understand the impact and application of hydrocarbonoclastic microorganisms in human life and the environment</li> <li>- Demonstrate working and communication attitude effectively in team.</li> </ul>
Teaching methods	Interactive Teaching
Contents (SAP)	
	1 Introduction
	2 Microorganisms in hydrocarbon system
	3 Hydrocarbon biodegradation
	4
	5 Biosurfactan
	6
	7 Mid-Term Test
	8 Petroleum waste in marine ecosystem
	9 Petroleum waste in fresh water ecosystem
	10 Petroleum waste in terrestrial ecosystem
	11 Microbial Enhanced Oil Recovery
	12
	13
	14 Topic Presentation
	15
	16 Final Test
Literature / Sources	<ul style="list-style-type: none"> <li>• Atlas, R.M. 1984. Petroleum Microbiology. Macmillan Publ. Co., New York</li> <li>• Kosaric, N. 1993. Biosurfactants: Production, Properties, and Applications. Marcel Dekker, Inc. New York.</li> <li>• Olliver, B., Magot, M., Petroleum Microbiology, 1, ASM Press, USA, 2005</li> </ul>
Other specialties	

#### 1.2.4. Sub-module V: Microbial-based energy

Lecturer	Neil Priharto, MT
Semester	8
Type of submodule / course	Elective
Credits	2
Workload - class lecture (hr/sem)	2 hours lectures, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 96 hours a semester
Workload details	Textbook reading assignment, group discussion, paper review, presentation
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written
Language	Bahasa Indonesia
Course Target / Outcome	<p>A. <b>Conceptual Knowledge and Competence:</b></p> <ul style="list-style-type: none"> <li>- Understand the metabolic processes both chemical and biochemical reactions of Microorganisms in the production of energy and fuels</li> <li>- Analyze technologies that can be applied to produce energy and fuels based on microorganisms</li> <li>- Conduct the final semester evaluation of energy and fuel production processes based on microorganisms</li> <li>- Design a concept of generating energy and fuel production by utilizing microorganisms</li> </ul> <p>B. <b>Scientific Skills:</b></p> <ul style="list-style-type: none"> <li>- Develop the ability to communicate and collaborate academically</li> <li>- Develop qualitative and quantitative approaches in developing microorganism-based energy technology</li> </ul>
Teaching methods	Interactive Teaching
Contents (SAP)	
	1
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	7 Mid-Term Test
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	15	
	16	Final Test
Literature / Sources		Konur, Ozcan. Bioenergy and Biofuels. CRC Press. 2018 <ul style="list-style-type: none"> <li>• Nag, Ahindra, Biofuels Refining and Performance. McGrawHill Int. Inc, 2008.</li> </ul>
Other specialties		