

**Course: Animals Products Bioprocess**

1. **Type** : Specialization's Compulsory
2. **Code** : PTH 6401
3. **Credit** : 3/0
4. **Semester** : Odd
5. **Description** :

Animal product whether it is food product or waste needs processing technology and treatment so it will produce animal food production that has good quality and animal waste which does not cause health environment problems. This course will discuss the microbes and enzyme utilization and also the bioprocess engineering in animal product processing. This course will support other related courses i.e Meat Processing and Industry, Advanced Milk Science and Technology, Advanced Egg Science and Technology, and Animal Waste Processing Technology.

**6. Course Outcomes (CO)**

- CO 1 : Able to identify microbes and enzyme for animal product processing.  
 CO 2 : Able to find out the characteristics of animal product and comprehend the analysis of bioprocess result.

**7. The Alignment Between CO and ELO**

CO*	ELO**																
	A				B			C				D					
	1	2	3	4	1	2	3	1	2	3	4	1	2	3	4	5	6
CO 1						✓					✓						
CO 2						✓					✓						

\*CO refers to point 6.

\*\*Expected Learning Outcomes (ELO) are written below,

<b>A. Attitudes and Behaviors</b>	
The graduates are able to behave well, correctly, and culturally as the result of internalization and actualization of values and norms, which is reflected in a spiritual and social life through learning process, experience, research, and/or community development in the animal husbandry.	
1	Piety to God and be able to show religious attitude and maintain the humanity values in carrying the task, which is based on religion, moral, and ethics.
2	Be proud and love the homeland show nationalism, and contribute to the improvement of the life quality in the community, nation and country, and the advancement of civilization according to Pancasila.
3	Showing the social sensitivity and attention to the community and environment by respecting the culture diversity, view, religious, beliefs, and other people's opinion, and also obey the rules.
4	Be accountable in carrying the professional practice that includes ability to accept accountability towards decision and professional action. It shall be according to the scope of the practice under their responsibility and laws.
<b>B. Mastery in Sciences</b>	
Master the theory of the current science in the animal husbandry and its application.	
1	Able to master the current animal science and its application theory.
2	Able to master the livestock production science, animal nutrition and fed science, animal products technology, and the livestock social economics in relation to food security and environment.

3	Able to master the design, management, and development of livestock research.
<b>C. Special Skills</b>	
The graduates are able to develop science, technology, and arts in the animal husbandry through interdisciplinary/multidisciplinary innovative and tested research.	
1	Able to make innovation in the animal husbandry based on the development of science and technology.
2	Able to design interdisciplinary and multidisciplinary research in the animal husbandry.
3	Able to formulate and solve problems in the national development especially in terms of animal husbandry.
4	Able to solve problems and anticipate issues in the development of animal science and industry.
<b>D. General Skills</b>	
The graduates are able to manage resources by utilizing science, technology, and arts to solve problems in the animal husbandry with current science and also conduct research with accountability and full responsibility.	
1	Able to develop logical, critical, systematic, and creative thought through scientific research, creation of design in the science and technology, which pays attention and applies humanity values according to their expertise. The graduates are able to arrange scientific concept and the study result based on the principles, procedures, and scientific ethics.
2	Able to identify the science that becomes their research object and position it to a research map by using information technology in the context of science development and expertise implementation developed through interdisciplinary or multidisciplinary approaches.
3	Able to make a decision in the context of solving problems in the development of science and technology, which pays attention and applies humanity values based on analysis study or experiment towards information and data.
4	Able to communicate the result of reasoning and scientific research in form of thesis and scientific writing responsibly based on academic ethics in the accredited national journal.
5	Able to maintain the academic integrity generally and avoid the plagiarism practice.
6	Able to communicate spoken and written English effectively by using the information technology for the development of animal science and its implementation.

## 8. Course Content

Week	CO	Topic/Subtopic	Learning Activity	Assessment Tools	Allocated Time	Lecturer
1	CO 1	Introduction	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Yuny Erwanto
2	CO 2	Genetic engineering of enzymes-producing bacterias	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Yuny Erwanto
3	CO 2	Protein purification	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Yuny Erwanto

4	CO 2	Chromatography	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Yuny Erwanto
5	CO 2	Ekektrofroresis	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Ambar Perwitiningrum
6	CO 2	HPLC	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Ambar Perwitiningrum
7	CO 1	Microbes for meat, milk and egg processing	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Ambar Perwitiningrum
<b>Midterm Examination</b>						
8	CO 1	Microbes for livestock industry waste	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Ambar Perwitiningrum
9	CO 1	Microbes for meat, milk and egg industry waste	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Nurliyani
10	CO 1	Enzyme for meat, milk and egg processing	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Nurliyani
11	CO 2	Technology of fermented meat	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Nurliyani
12	CO 2	Technology of fermented milk	Tutorial class; discussion	Midterm, final exam, and participation	3 x 50 minutes	Nurliyani
13	CO 1 CO 2	Paper presentation	Presentation and discussion	Participation	3 x 50 minutes	Jamhari

14	CO 1 CO 2	Paper presentation	Presentation and discussion	Participation	3 x 50 minutes	Jamhari
<b>Final Examination</b>						

### 9. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Midterm	CO 1; CO 2	30	70
Quiz	CO 1; CO 2	10	70
Presentation	CO 1; CO 2	10	70
Paper	CO 1; CO 2	20	70
Final Exam	CO 1; CO 2	30	70
<b>Total</b>		100	

### 10. Lecturer

1. Dr. Ir. Jamhari, S.Pt., M.Agr.Sc., IPM.
2. Ir. Ambar Pertiwiningrum, S.Pt., M.Si., Ph.D., IPM.
3. Ir. Nanung Agus Fitriyanto, S.Pt., M.Sc., Ph.D., IPM.
4. Prof. Dr. Ir. Nurliyani, S.Pt., M.S., IPM.
5. Ir. Yuny Erwanto, S.Pt., MP., Ph.D, IPM.

### 11. Reference

1. Sarfaraz K. ,Niazi, Justin, L. Brown, 2017. Fundamentals of Modern Bioprocessing. CRC Press.
2. Palmel, T., 1991. Understanding Enzyme. 3rd ed. Ellis Horwood Limited, Market Cross House, Cooper Street, Chichester, West Sussex, PO19 IEB, England.
3. Price N.C., and L. Stevens, 1989. Fundamentals of Enzymology. 2nd ed. Oxford University Press, New York.