Course: Research Techniques in Animal Nutrition and Feed Science

1. **Type**   **:** Specialization's Compulsory
2. **Code**   **:** PTN 6103
3. **Credit**   **:** 2/0
4. **Semester**   **:** Even
5. **Description**   **:**

Students in the graduate program need adequate knowledge in conducting research so that the results can be trusted and accounted. This course provides knowledge concerning research that often used in the animal nutrition and feed science. Basic principles in research techniques are provided to guide student sin better understanding the techniques, to create comprehensive discussion from a research. This course contains several research techniques, either conducted in the laboratory or on site. Courses are done by theory and discussion that students are expected to be able to choose the appropriate research techniques, able to design research techniques either from logistic aspects, retrieval and preparation of samples for both livestock and feed, and data analysis.

6. **Course Outcomes (CO)**

   CO 1   : Students are able to understand research theories and techniques, coordinate the logistic needed, take the right samples, process and draw conclusion from the data obtained.

   CO 2   : Students are able to design a study with suitable research techniques and coordinate the research techniques to be carried out.

   CO 3   : Students master research techniques related to animal nutrition and feed science, competent to work interdisciplinary, as well as communicate their ideas and opinions.

   CO 4   : Able to solve problems and anticipate issues in the development of animal science and industry.

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 3													✓				

   *CO refers to point 6.

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

A. Attitudes and Behaviors
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. Mastery in Sciences

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.

C. Special Skills

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.

D. General Skills

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; CO 2	Introduction Techniques on feed analysis and evaluation,	Classical lecture and discussion	Exam	2 x 50 minutes	Ristianto Utomo

		experimental design				
2	CO 1; CO 2; CO 3	Digestibility evaluation on ruminant	Classical lecture and discussion	Exam	2 x 50 minutes	Ristianto Utomo
3	CO 1; CO 2; CO 3	Digestibility evaluation on pasture land by using indicator	Classical lecture and discussion	Exam	2 x 50 minutes	Bambang Suhartanto
4	CO 1; CO 2; CO 3; CO 4	Techniques on grass breeding	Flip class; e-learning assignment	Exam	2 x 50 minutes	Nafiatul Umami
5	CO 1; CO 2; CO 3; CO 4	Analysis of genetic diversity by using RAPD-PCR	Flip class; e-learning assignment	Exam	2 x 50 minutes	Nafiatul Umami
6	CO 1; CO 2; CO 3	Techniques on urine separation; poultry faeces	Classical lecture and discussion	Exam	2 x 50 minutes	Zuprizal
7	CO 1; CO 2; CO 3	Techniques on energy measurement (poultry)	Classical lecture and discussion	Exam	2 x 50 minutes	Zuprizal
Midterm Examination						
8	CO 1; CO 2; CO 3	In sacco	Classical lecture and discussion	Exam	2 x 50 minutes	Kustantinah
9	CO 1; CO 2; CO 3	Techniques on protein degradation measurement (small intestine)	Classical lecture and discussion	Exam	2 x 50 minutes	Kustantinah
10	CO 1; CO 2; CO 3; CO 4	Estimation of ruminal microbes protein synthesis (indigenous cattle)	Classical lecture and discussion	Exam	2 x 50 minutes	Zaenal Bacruddin

11	CO 1; CO 2; CO 3	Fermentation kinetics	Classical lecture and discussion	Exam	2 x 50 minutes	Lies Mira
12	CO 1; CO 2; CO 3	Microbes protein	Classical lecture and discussion	Exam	2 x 50 minutes	Lies Mira
13	CO 1; CO 2; CO 3	Techniques on body composition evaluation (in vivo)	Classical lecture and discussion	Exam	2 x 50 minutes	Ali Agus
14	CO 1; CO 2; CO 3	Techniques on mycotoxin analysis	Classical lecture and discussion	Exam	2 x 50 minutes	Ali Agus
15	CO 1; CO 2; CO 3	Techniques on bio diversification	Flip class, e-learning	Exam	2 x 50 minutes	
16	CO 1; CO 2; CO 3	Techniques on chemical separation	Classical lecture and discussion	Exam	2 x 50 minutes	
Final Examination						

9. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Class participation	CO 1; CO 2; CO 3	20	70
Discussion	CO 3	10	70
Midterm	CO 1; CO 2	30	70
Final exam	CO 1; CO 2; CO 3	40	70
Total		100	

10. Lecturer
1. Tim Dosen Pengampu

11. Reference
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6. Pirt, J. 1985. Principles of Microbe and Cell Cultivation.

7. Stanbury, P.F. and A. Whitetaker. 1987. Principle of Fermentation Technology.

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