06 December 2018

Course: Instrumentation in Animal Nutrition and Feed Science

1. **Type** **:** Specialization's Elective
2. **Code** **:** PTN 6109
3. **Credit** **:** 2/0
4. **Semester** **:** Even
5. **Description** **:**

   This course is available for students who are interested in becoming experts in animal nutrition and feed science. This course also provides knowledge on how to use instruments, sample preparation, and analytical procedure in the field of animal nutrition and feed science.

6. **Course Outcomes (CO)**

   CO 1 : Comprehend about the related basic instruments used in the field of animal nutrition and feed science.

   CO 2 : Comprehend about the procedure in sample preparation and further analysis by using related instruments.

   CO 3 : Able to interpret the analysis result and create report.

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	Introduction: • Syllabus • Learning contract	Classical lecture; discussion	Midterm	2 x 55 minutes	Prof. Dr. Ir. Zuprizal, DEA., IPU
2	CO 2	Sample preparation: Liquid and solid sample	Classical lecture; discussion	Midterm	2 x 55 minutes	Ir. Nanung Danar Dono, S.Pt., M.P., Ph.D., IPM
3	CO 1	Calorimetry: Bomb calorimeter	Classical lecture; discussion	Midterm	2 x 55 minutes	Ir. Cuk Tri Noviandi, S.Pt., M.Anim.St., IPU

4	CO 1	PCR	Classical lecture; discussion	Midterm	2 x 55 minutes	Dr. Ir. Chusnul Hanim, M.Si., IPM
5	CO 2	In vivo: consumption	Classical lecture; discussion	Midterm	2 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA
6	CO 3	In vivo: digestibility	Classical lecture; discussion	Midterm	2 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA
7	CO 3	Two stage – rumen and post rumen	Classical lecture; discussion	Midterm	2 x 55 minutes	Prof. Dr. Ir. Ali Agus, DAA., DEA., IPU
Midterm Examination						
8	CO 3	Electrophoresis	Classical lecture; discussion	Final Exam	2 x 55 minutes	Ir. Nafiatul Umami, S.Pt., M.P., Ph.D., IPM
9	CO 1	In vitro gas test: gas production	Classical lecture; discussion	Final Exam	2 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA
10	CO 3	In vitro gas test: calculation	Classical lecture; discussion	Final Exam	2 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA
11	CO 3	Spectrophotometer	Classical lecture; discussion	Final Exam	2 x 55 minutes	Prof. Dr. Ir. Lies Mira Yusiati, SU., IPM
12	CO 1	AAS: instrument explanatory	Classical lecture; discussion	Final Exam	2 x 55 minutes	Prof. Dr. Ir. Zuprizal, DEA., IPU
13	CO 3	AAS: instrument demonstration	Classical lecture; discussion	Final Exam	2 x 55 minutes	Prof. Dr. Ir. Zuprizal, DEA., IPU
14	CO 3	Gas cromatography	Classical lecture; discussion	Final Exam	2 x 55 minutes	Prof. Dr. Ir. Lies Mira Yusiati, SU, IPM
Final Examination						

9. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Midterm	CO 1; CO 2; CO 3	50	70
Final Examination	CO 1; CO 3	50	70
Total		100	

10. Lecturer

1. Prof. Dr. Ir. Zuprizal, DEA., IPU.
2. Prof. Dr. Ir. Kustantinah, DEA.
3. Prof. Dr. Ir. Lies Mira Yusiati, SU., IPU.
4. Prof. Dr. Ir . Ali Agus, DAA., DEA., IPU.
5. Dr. Ir. Chusnul Hanim, M.Si., IPM.
6. Ir. Nanung Danar Dono, S.Pt., M.P., Ph.D., IPM.
7. Ir. Cuk Tri Noviandi, S.Pt., M.Anim.St., Ph.D., IPM.
8. Ir. Nafiatul Umami, S.Pt., M.P., Ph.D., IPM.

11. Reference

1. McDonald, P., Edwards, R.A., Greenhalgh, J.F.D., and Morgan, C.A. 2002. Animal Nutrition. Sixth Edition. Pearson Education Limited. Edinburgh Gate. Harlow. UK.