Course: Improvement of Animal Reproduction Efficiency
1. **Type** : Specialization's Compulsory
2. **Code** : PTR 6501
3. **Credit** : 2/1
4. **Semester** : Odd
5. **Description** :

Various application reproduction technologies are used as an attempt to improve the animal productivity, one of them is artificial insemination, synchronization, estrus, etc. The course of reproduction efficiency improvement discusses clearly about the synchronization of estrus, freeze/melted sperm processing, artificial insemination, superovulation, fertilization, embryo collection, and embryo transfer.

Cloning and transgenic are also discussed in this course. By taking this course, the optimum animal productivity is expected to be achieved.

6. **Course Outcomes (CO)**

CO 1 : Students understand that the improvement of animal reproduction efficiency can be done in various livestock through several ways/process i.e by well-recording, ability to synchronize and great lust detection, strong ability to do insemination, pregnant detection and breeding procedures which is well-maintained. Have also capability to do the selection and embryo transfer.

CO 2 : Students must know when the animal must be breeded, arrange the precise birth interval (for example calving internal – 1 year, lambing/kidding interval 8 month).

CO 3 : Students have to find out that the animal reproduction efficiency improvement will be able to improve the farmer income and improve foreign exchange.

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: Reproductive efficiency definition	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	

2	CO 1	Methods on measuring reproductive efficiency: S/C, PPE/PPM, CR, breeding interval	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
3	CO 2	Oestrous synchronization: Progesterone, PGF2 alpha for oestrous synchronization/ induction	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
4	CO 1; CO 2	Oestrous detection: time and methods	Classical lecture, discussion, presentation	Quiz, assignment, discussion	2 x 50 minutes	
5	CO 1	Sperm collection, processing, and thawing: methods	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
6	CO 1; CO 2; CO 3	Sperm quality evaluation	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
7	CO 1; CO 2; CO 3	Sperm processing	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
Midterm Examination						
8	CO 1; CO 2; CO 3	Liquor and frozen sperm processing	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
9	CO 1; CO 2	Artificial insemination: methods	Classical lecture, discussion, presentation	Quiz, assignment, discussion	2 x 50 minutes	
10	CO 1	Pregnancy diagnosis: methods	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
11	CO 1; CO 2	Artificial insemination	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	

		evaluation: S/C, NR, CR, and CI				
12	CO 1	Superovulation: embryo collection (in vitro and in vivo)	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
13	CO 1	In vitro fertilization	Classical lecture, discussion	Quiz, assignment, discussion	2 x 50 minutes	
14	CO 1	Sperm preparation; fertilization; embryo culture	Classical lecture, discussion, presentation	Quiz, assignment, discussion	2 x 50 minutes	
Final Examination						

9. Practicum

Week	Activity	Methods	Total Hours
1	Sperm collection	Using artificial vagina	4
2	Sperm evaluation	Macroscopic and microscopic evaluation	4
3	Sperm freezing process	Freezing using liquid nitrogen	4
4	Artificial insemination	Artificial insemination on goat	4
5	Embryo evaluation	Embryo evaluation	4

10. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Midterm		30	70
Quiz	CO 1	5	70
Presentation	CO 1; CO 2	5	70
Paper	CO 1	10	70
Final Exam	CO 1; CO 2; CO 3	30	70
Practicum	CO 3	20	70
Total		100	

11. Lecturer

1. Prof. Ir. Ismaya, M.Sc., Ph.D.
2. Dr. Ir. SIgit Bintara, S.Pt., M.Si., IPM.
3. Ir. Diah Tri Widayati, S.Pt., MP., Ph.D., IPM.

12. Reference