

Course: Improvement of Animal Genetic Quality

1. **Type** : Specialization's Compulsory
2. **Code** : PTR 6502
3. **Credit** : 3/0
4. **Semester** : Even
5. **Description** :

The Improvement of Animal Genetic Quality is a course that learns the animal mutual genetics and animal genetics quality improvement in population scale with final purpose to get the animal population with high quality genetics based on a certain economics characteristics.

The material that is discussed encompasses the genetics basic concept and statistics, genetics structure in a certain population, genetics frequency alteration, inbreeding and population size, quantitative diversity, heritability, genetics correlation, selection, the purpose of selection, selection trial, character threshold, inbreeding depression, heterosis, nation and its formation, polymorphism, biochemical, and population genetics.

Students who have taken this course is expected to comprehend and able to explain the genetics basic concept and statistics in animal population, the reason behind the genetics imbalance and steps which have to be taken so the population which cause the inbreeding situation and inbreeding depression, heterosis event in population, genetics influence towards the quantitative diversity, gen frequency alteration as a cause of selection implementation, nation formation influence toward the gen frequency.

6. Course Outcomes (CO)

- CO 1 : Students are able to comprehend the concept of animal genetics quality improvement
- CO 2 : Students are able to apply the comprehension and knowledge from this course to recognize the genetics characteristics in animal population in connection with the inbreeding activity, heterosis, new nation formation, polymorphism biochemistry, so it can be determine the precise steps to increase the animal genetics mutual in population scale.

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,

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	<p>Introduction:</p> <ul style="list-style-type: none"> • Technological development in the field • Advantages of genetic improvement • Factors affecting genetic quality 	Classical lecture, discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
2	CO 1	Basic concepts of genetic and statistics	Classical lecture, discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
3	CO 1	<p>Population genetic structures</p> <ul style="list-style-type: none"> • Hardy-Weinberg Law • Sex linkage • Linkage • Qualitative characteristic analysis • Gene frequency estimation 	Classical lecture, discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
4	CO 1	<p>Gene frequency alteration</p> <ul style="list-style-type: none"> • Mutation • Migration • Selection • Selection for heterozygote • Random drift selection and mutation from gene frequency 	Classical lecture, discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.

5	CO 1	Quantitative inbreeding diversity: <ul style="list-style-type: none"> • Inbreeding and population size • Gene effects • Diversity • Repeatability 	Classical lecture, discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
6		Heritability <ul style="list-style-type: none"> • Effective heritability • Genetic similarity association • Heritability estimation • Heritability review Genetic correlation: <ul style="list-style-type: none"> • Correlation genetic and genotype-environment relationship 	Classical lecture, discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
Midterm Examination						
7	CO 2	Selection: <ul style="list-style-type: none"> • Gene frequency alteration, resulted from selection • Indirect selection • Selection for some traits • Economical value on performance 	Classical lecture, discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.

		recording and genetic <ul style="list-style-type: none"> • Factors affecting the poor selection response 				
8	CO 2	Selection support: <ul style="list-style-type: none"> • Average traits • Parental information • Progeny test • Undesired gene test • Family and half-sibling test • Selection index 	Classical lecture, discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
9	CO 2	Selection experiment <ul style="list-style-type: none"> • Selection response • Negative selection • Alteration on average production, population/year 	Classical lecture, discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
10	CO 1	Limiting point character: <ul style="list-style-type: none"> • Definition • Heritability value alteration • Genetic diversity Heterosis: <ul style="list-style-type: none"> • Definition • Genetic alteration caused by heterosis 	Classical lecture, discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.

		<ul style="list-style-type: none"> • Selection limit on heterosis trait 				
11	CO 2	Breed development <ul style="list-style-type: none"> • Breed and Mendel Law • Gene frequency alteration on the animal breed 	Classical lecture, discussion		3 x 50 minutes	Ir. Tety Hartatik S.Pt., Ph.D., IPM
12	CO 2	Biochemical and polymorphism and population genetic <ul style="list-style-type: none"> • Definition • Genetic diversity on population with polymorphism trait 	Classical lecture, discussion		3 x 50 minutes	Ir. Tety Hartatik S.Pt., Ph.D., IPM
13	CO 1	Capita selecta polymorphism/ monomorphism gene on	Classical lecture, discussion		3 x 50 minutes	Ir. Dyah Maharani S.Pt., MP., Ph.D., IPM
14	CO 1	Molecular genetic application on ruminant	Classical lecture, discussion	Presentation	3 x 50 minutes	Ir. Dyah Maharani S.Pt., MP., Ph.D., IPM
15	CO 1	Molecular genetic application on non-ruminant	Classical lecture, discussion	Presentation	3 x 50 minutes	Ir. Dyah Maharani S.Pt., MP., Ph.D., IPM

Final Examination

9. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Quiz	CO 1	5	70
Presentation	CO 2	5	70
Paper	CO 2	20	70
Midterm	CO 1	35	70
Final Exam	CO 1	35	70
Total		100	

10. Lecturer

1. Prof. Dr. Ir. Sumadi, MS., IPU.
2. Ir. Tety Hartatik, S.Pt., Ph.D., IPM.
3. Ir. Dyah Maharani, S.Pt., MP., Ph.D., IPM.

11. Reference

1. Hardjosubroto, W. 1994. Aplikasi Pemuliaan Ternak di Lapangan. PT. Gramedia Widiasarana, Jakarta.
2. Becker, W. A. 1992. Manual of Quantitative Genetics. Fifth Edition. Academic Enterprises. Pullman. Washington.
3. Kurnianto, E. 2009. Pemuliaan Ternak. Graha Ilmu. Yogyakarta. Indonesia.
4. Lasley, J. F. 1978. Genetics of Livestock Improvement. Edisi Ketiga. Prentice Hall. Inc. Englewood Cliffs. New Jersey.
5. Falconer, D. S. dan T. F. C. Mackay. 1996. Introduction to Quantitative Genetics. Fourth Edition. Longman Group Ltd. Malaysia.
6. Jurnal mengenai pemuliaan ternak terbaru, video