

Course: Cytogenetics

1. **Type** : Specialization's Elective
2. **Code** : PTR 6508
3. **Credit** : 3/0
4. **Semester** : Even
5. **Description** :

Cytogenetics is a course discussion various aspects related to cell, i.e. shape and structure of chromosome, chromosome behavior, changes on chromosome shape and number, chromosome evolution and its phenotypic expression. Contents discussed in this course include theory of chromosome and its relationship with inheritance, chromosome types, changes on chromosome structure, changes on number of chromosome, cytoplasmic inheritance, possibility of phenotypic abnormalities caused by chromosome mutation.

6. Course Outcomes (CO)

- CO 1 : Able to comprehend the concept of cytogenetics on animal breeding and selection.
- CO 2 : Able to apply their knowledge attained from the course on animal breeding and selection.

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	Introduction - the history of chromosome and genetics - chromosome and inheritance	Lecture/ discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
2	CO 1	Mechanism of inheritance - cell and inheritance - mitosis division	Lecture/ discussion		3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
3	CO 1	Mechanism of inheritance (cont.)	Lecture/ discussion		3 x 50 minutes	Prof. Dr. Ir.

		- cell and inheritance - mitosis division				Sumadi, M.S., IPU.
4	CO 1	Chromosome - chromosome's mitosis - animal abnormalities caused by the chromosome breakage and the forming of ring chromosome	Lecture/ discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
5	CO 1	Changes on chromosome structure - deletion or deficiency - duplication inversion	Lecture/ discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi, M.S., IPU.
6	CO 1	Changes on chromosome structure (cont.) Definition of translocation, reciprocal translocation, chromosome segregation on heterozygote translocation	Lecture/ discussion	Quiz	3 x 50 minutes	Prof. Dr. Ir. Sumadi., M.S., IPU.
Midterm Examination						
7	CO 1	Translocation genetics - individual testcross on heterozygote translocation	Lecture/ discussion		3 x 50 minutes	Ir. Dyah Maharani, S.Pt., MP., Ph.D., IPM.

8	CO 1	Changes on chromosome number - euploidy - monoploidy - diploidy	Lecture/ discussion		3 x 50 minutes	Ir. Dyah Maharani, S.Pt., MP., Ph.D., IPM.
9	CO 2	Changes on chromosome number (cont.) - polyploidy - general characteristics of polyploidy - polyploidy - polyploidy on animal and human - cell fusion and transfer from animal genes	Lecture/ discussion	Paper/ presentation	3 x 50 minutes	Ir. Dyah Maharani, S.Pt., MP., Ph.D., IPM.
10	CO 1	Monosomy - types of monosomy - genetics of monosomy - monosomy in human - nullisomy	Lecture/ discussion		3 x 50 minutes	Ir. Dyah Maharani, S.Pt., MP., , Ph.D., IPM.
11	CO 1	Trisomy - types of trisomy - genetic balance - trisomy genetics	Lecture/ discussion		3 x 50 minutes	Ir. Dyah Maharani, S.Pt. MP., Ph.D., IPM.
12	CO 1	Cytoplasmic inheritance - cytoplasmic inheritance - mitochondrial inheritance	Lecture/ discussion		3 x 50 minutes	Ir. Tety Hartatik, S.Pt. Ph.D., IPM.
13	CO 1	Cytoplasmic inheritance	Lecture/ discussion		3 x 50 minutes	Ir. Tety Hartatik,

		- cytoplasmic inheritance - mitochondrial inheritance				S.Pt., Ph.D., IPM.
14	CO 1	Cytoplasmic inheritance - maternal effects - cytoplasmic transfer from symbiont	Lecture/ discussion		3 x 50 minutes	Ir. Tety Haratik, S.Pt., Ph.D., IPM.
15	CO 2	Capita selecta on animal genetic - maternal effects - cytoplasmic transfer from symbiont	Lecture/ discussion	Paper/ presentation	3 x 50 minutes	Ir. Tety Hartatik, S.Pt., 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. Lasley, J. F. 1978. Genetics of Livestock Improvement. Edisi Ketiga. Prentice Hall. Inc. Englewood Cliffs. New Jersey.

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4. Falconer, D. S. dan T. F. C. Mackay. 1996. Introduction to Quantitative Genetics. Fourth Edition. Longman Group Ltd. Malaysia.