

Curriculum for Course: Zool. H. 301

Course Title	Genetics & Animal Breeding
Course Code	Zool. H. 301
Type of Course	Theory (Core Course, Mandatory)
Level/Year	5 th Semester (3 rd Year)
Teaching Period	Full Year
Course Pre-requisites	Requisite Grade in the 2 nd Year (4 th Semester)
Unit and Credits	1 Unit, 4 Credits
Total Lecture hours	60 (each Lecture of 45 min duration)
Full Marks for Final Written Exam	100
Duration of Final Written Exam	4 hours
Course Tutors	Prof. Dr. M. S. Islam

1. Course Overview

The course is designed to fortify the knowledge and understanding of the learners about various aspects of Cell Biology (Prof. MG Mortuza) & Genetics and Animal Breeding. It will help them comprehend types of cells, cell division. The course will also help enrich the existing ideas of the students on the basic work of Mendel, his laws of inheritance and their deviations. In addition, types and mechanisms of linkage and crossing-over, sex-linked inheritance in man and *Drosophila*, gene and chromosomal mutations, ABO blood groups and their inheritance, various mechanisms of sex determination in animals, Hardy-Weinberg law and its uses in population genetic studies, extra-nuclear inheritance and types and applications of animal breeding for farm animals.

2. Course Learning Outcomes (CLOs)

After completion of this course, learners will be able to:

1. Know about the work of Johann Mendel, the father of Genetics, explain Mendelism, and define the common terminologies used in Genetics
2. Describe and explain with examples the Mendelian crosses and ratios in garden peas and animals
3. Explain allelic and non-allelic interactions, and deviations from Mendel's laws
4. Explain with examples deviations from Mendelian monohybrid and dihybrid ratios
5. Classify, explain and compare linkage and crossing-over along with their significance
6. Describe and compare sex-linked, sex-limited and sex-influenced traits particularly in man and *Drosophila*
7. Define, compare and explain multiple and pseudoalleles with special reference to ABO blood groups and their medico-legal applications
8. Describe and understand various mechanisms of sex determination in animals and their abnormalities
9. Describe types, mechanisms and detection of gene mutations
10. Describe types of chromosomal mutations along with their practical applications
11. Classify and explain chromosomal aberrations, their origin and frequencies in man
12. Interpret extra-nuclear inheritance in animals and compare it with nuclear inheritance
13. Define population genetics and describe Hardy-Weinberg law and its derivation
14. Describe inbreeding, outbreeding and cross breeding and their genetic effects
15. Apply animal breeding principles for improving farm animals

3. Course contents, teaching strategies, assessment techniques and alignment of lectures with CLOs

Course contents	Teaching-learning strategies	Assessment techniques	Alignment of lectures with CLOs
Lecture 1: Introduction to Genetics; work of Mendel and common terminologies used in Genetics	1. Lecturing will commence with greetings to the learners for their attention; then queries related to the lecture will be asked to the students to assess their prior knowledge. 2. Attempts will be made to create interest of the learners to the lecture by using power point multimedia projector as well as interactive questions and answering techniques. 3. Lecture will be concluded with encouraging comments on the performance of the learners to refresh their mind for the next class, the topic of which will be declared in advance.	1. Feedback on the lecture will be taken by asking the learners some relevant questions and by asking to explain the main topics of the lecture just delivered to them. 2. Group discussions and assignments on the delivered lecture will be called upon within a couple of weeks following a lecture. 3. Power point presentation by the students will be sought in the end of the course.	CLO-1
Lecture 2: Mendelian crosses and ratios in experimental organisms	As above	Lab demonstrations with <i>Drosophila</i>	CLO-2
Lecture 3: Deviations from Mendel's laws of inheritance and their explanations	As above	As in Lecture1	CLO-3
Lecture 4: Allelic and non-allelic interactions; Deviations from monohybrid and dihybrid cross ratios	As above	As in Lecture1	CLO-4
Lecture 5: Linkage and crossing-over, their types, theories and significance	As above	As in Lecture1	CLO-5
Lecture 6: Sex-linked, sex-limited and sex-influences traits in man and other animals	As above	Lab demonstrations with <i>Drosophila</i>	CLO-6
Lecture 7: Multiple and pseudoalleles in animals; inheritance of ABO blood groups in man and their medico-legal applications	As above	As in Lecture1	CLO-7
Lecture 8: Various mechanisms of sex determination in animals and their abnormalities such as gynandromorphs, hermaphrodites and sex mosaics	As above	As in Lecture1	CLO-8
Lecture 9: Mutations-1: Gene mutations, their types, mechanisms and detection by CIB and Muller-5 methods	As above	As in Lecture1	CLO-9
Lecture 10: Mutations-2: Structural and numerical chromosomal mutations, their origin and practical applications	As above	As in Lecture1	CLO-10
Lecture 11: Chromosomal aberrations, their causal factors, origin and	As above	Lab demonstrations with human karyotypes	CLO-11

frequencies in man			
Lecture 12: Cytoplasmic or extra-nuclear inheritance in <i>Paramecium</i> and <i>Drosophila</i> ; Differences between nuclear and extra-nuclear inheritance	As above	As in Lecture1	CLO-12
Lecture 13: Population genetics; Hardy-Weinberg law, its derivation, limiting factors and calculations of gene and genotype frequencies in a population	As above	Calculations of gene and genotype frequencies in a sample/population in the classroom	CLO-13
Lecture 14: Animal breeding: Brief history, Types of breeding and their genetic effects	As above	As in Lecture1	CLO-14
Lecture 15: Applications of inbreeding, outbreeding and crossbreeding for improvement of farm animals like chicken, cattle, sheep and goat	As above	Lab demonstrations with silkworm cocoons	CLO-15

4. Evaluation System

Type of Assessment	Components	Marks	Methods of Assessment
Final Written Examination	Broad Questions	50	Evaluation of the written exam scripts by the course tutor
	Objective and Short Questions	50	
Continuous Assessment	Attendance		
	Tutorial		

5. Learning Resources

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- Morgan, RF. 1965. Environmental Biology. Vol. 3 The MacMillan Co., New York

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- ইসলাম, এম.সা, খান, হা.সা. ও রানা, মো. হা.তা. ২০১৭। জেনেটিক্স: মিল ও অমিলের বিজ্ঞান। অন্যপ্রকাশ, বাংলাবাজার, ঢাকা।
- খান, হা.সা. ও ইসলাম, এম.সা. ২০১১। জৈবপ্রযুক্তি এবং জীন প্রকৌশল। আগামী প্রকাশনী, বাংলাবাজার, ঢাকা।

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