האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

GENETICS AND BREEDING OF FARM ANIMALS - 73802

Last update 12-09-2023

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Animal Sciences - International Program

Academic year: 0

Semester: 2nd Semester

Teaching Languages: English

Campus: Rehovot

Course/Module Coordinator: Roni Tadmor-Levi

Coordinator Email: roni.tadmor@mail.huji.ac.il

Coordinator Office Hours: Tuesdays, 12:00 - 13:00

Teaching Staff:

Dr. Roni Tadmor

Course/Module description:

Farm animals and pets have accompanied humans from very early on and in this course the genetics of traits valuable for humans and how breeding is was used to improve them will be considered. Relevant principals of population genetics and quantitative genetics will be taught that allow understanding the domestication process of animals and the differences from their wild relatives. Using these same principals the methodology and rational of animal breeding will be demonstrated for major farm animals like cattle (dairy and beef), poultry (egg laying hens and broilers) and fish. Lastly, more advanced topics in breeding and biotechnological tools that make use of molecular information will be presented and their potential advantages for animal breeding and health will be discussed.

Course/Module aims:

1. Understanding the major principles of population genetics and quantitative genetics.
2. Obtaining sufficient knowledge to understand the genetic principles and considerations used for farm animals breeding.
3. Understanding of how the biology of each species and the traits of interest affect the breeding program of major farm animal species.
4. Obtaining current knowledge in methods and terms of modern genetics, which will enable students to stay updated in the field on their own.

Learning outcomes - On successful completion of this module, students should be able to:

1. Recognize the major areas of genetics.
2. Describe of principles underlying the acts of breeding programs in major farm animal species.
3. Approach breeding of new animal species pending on their biology and the traits of interest.
4. Gain new knowledge. 5. Remain updated in this field.

Attendance requirements(%):

Attendance is critical but not mandatory

Teaching arrangement and method of instruction: Each week the course includes three hours of frontal lecture that includes discussion, Q&A and demonstrations of learning subjects. According to subjects, students will be given exercises for home.

Problems in home exercises will be discussed in the class.

Course/Module Content:

1. Principles in genetics. Reviewing general genetic principals relevant to animal breeding.
2. Principals in population genetics. Alleles and genes in populations. Genetic variation. H-W equilibrium.
3. Natural selection. Genetic drift, animal domestication. Genetic management of brood stocks.
4. Principles of quantitative genetics. The genetic basis of quantitative/production traits. Dominance and epistasis. Mass selection. Heritability.
5. Other methods for selection. Estimating genetic improvement.
6. Crossbreeding. Heterosis. Inbreeding.
7. Chicken breeding. Genetic by Environment interaction.
8. DNA markers. Estimating variability. Genetic identification. Genetic maps. Linkage between markers and traits. 9. Dairy Cattle breeding.
10. Beef Cattle/Swine breeding.
11. Fish breeding.
12. Biotechnology in farm animals. 13. Genomics and advanced methods in breeding.

Required Reading:

None

Additional Reading Material:

Bowman J.C., 1974. An introduction to animal breeding. Edhard Arnold.

Falconer D.S., 1996. Introduction to quantitative genetics. Longman, London and NY.

Grading Scheme:

Written / Oral / Practical Exam 70 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 30 %

Additional information:

None