Syllabus

ANIMAL GENETICS AND BREEDING OF FARM ANIMALS - 71091

Last update 29-01-2017

**HU Credits:** 3

**Degree/Cycle:** 1st degree (Bachelor)

**Responsible Department:** animal sciences

**Academic year:** 0

**Semester:** 2nd Semester

**Teaching Languages:** Hebrew

**Campus:** Rehovot

**Course/Module Coordinator:** Roni Tadmor-Levi

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

**Coordinator Office Hours:** Sunday 12-1 PM

**Teaching Staff:**

Prof
Course/Module description:
Farm animals and pets have accompanied humans from very early on and in this course the genetics of traits that humans had value 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 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:
The aims of this course are:
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. Know major areas of genetics.
2. Recognize 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 and remain updated in this field.

Attendance requirements(%):
Attendance is critical for understanding but there is no mandatory attendance requirements
Teaching arrangement and method of instruction: Each week the course includes two hours of frontal lecture that includes discussion, Q&A and demonstrations of learning subjects. One hour of tutoring follows the lectures during which students will practice solving problems in major subjects. The course includes two elective mid-term quizzes. Students are required to solve problems at home.

Course/Module Content:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Exercise</th>
<th>Home duty</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction, animal domestication, why breeding animals? Basic genetics, polymorphism estimates</td>
<td>Exer. 1</td>
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<tr>
<td>2</td>
<td>Principles in population genetics, allele and genotype frequency, H-W equilibrium</td>
<td>Allele frequency, H-W equilibrium Exer. 2</td>
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<td>3</td>
<td>Natural selection and selection models</td>
<td>Selection models Exer. 3</td>
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<td>4</td>
<td>Sex linked traits in populations of Aves and Mammals</td>
<td>Maternal effects and sex linked inheritance Exer. 4</td>
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<td>5</td>
<td>Phenotypic and genetic variation components, quantitative traits</td>
<td>1st quiz Inheritance in populations</td>
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<td>6</td>
<td>Heritability and mass selection</td>
<td>Variance components and heritability Exer. 5</td>
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<td>7</td>
<td>Crossbreeding, beef cattle breeding</td>
<td>Inbreeding, correlated response to selection Exer. 6</td>
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<td>8</td>
<td>Genetic variation, DNA markers</td>
<td>Estimating genetic gain Exer. 7</td>
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<td>9</td>
<td>Animal biotechnology long term consequences of selection</td>
<td>Paper- guided reading</td>
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<td>10</td>
<td>Poultry breeding 2nd quiz Quantitative traits and selection</td>
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<td>11</td>
<td>Dairy cattle breeding</td>
<td>Crossbreeding Exer. 9</td>
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<td>12</td>
<td>Familial structures and gene mapping</td>
<td>Molecular methods Exer. 10</td>
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<td>13</td>
<td>Genetic basis of selected traits</td>
<td>Summary Q&amp;A</td>
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Required Reading:
Guided reading of a scientific paper

Additional Reading Material:


Course/Module evaluation:
End of year written/oral examination 70 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
**Assignments 10 %**  
**Reports 0 %**  
**Research project 0 %**  
**Quizzes 20 %**  
**Other 0 %**  

**Additional information:**  
*Each of the elective mid-term quizzes will provide up to 10% of the final course grade.*  
The final exam will provide up to 90% of the final grade depending on the grades in the mid-term quizzes.  
*Mandatory on-time submission of the home exercises (It's possible to miss submission of up to two exercises).*