



UNIVERSIDADE DE LISBOA
Faculdade de Medicina Veterinária

Genetics and Animal Breeding

Curricular Year: 2nd

Duration: 1st Semester

Credits: 7 ECTS

Teachers: Vítor Alves (CCP e R); Catarina Ginja.

Contact Hours: 92H Total.

56H Lectures; 36H Practical and laboratory teaching.

Learning objectives:

Acquire the principles and methodologies on molecular, cyto, mendelian and population genetics; To know the mechanisms of transmission of hereditary traits, molecular basis of genetic diseases, and the main breed and species specific genetic diseases; To interpret patient history and pedigree information; To understand cytogenetic and molecular genetics methodologies, GWAS, uniparental molecular markers, genetic diversity and population structure evaluation; Interpret normal and aberrant karyotypes of domestic species; Use of OMIA/NCBI to search genetic information; To develop knowledge about the applications of population, quantitative and molecular genetics in the improvement and conservation of Animal Genetic Resources; Evaluation of the impact of mating systems (inbreeding and crossbreeding) in animal production; To know the methods of genetic evaluation and prediction of expected responses to selection; To know the main organized genetic breeding systems in livestock species..

Program contents:

- Veterinary Medicine and Genetics: genetic bases of normal and pathological situations
- Molecular genetics
- Epigenetics
- Genetic polymorphism
- Gene linkage analysis
- Cytogenetics
- Immunogenetics
- Population Genetics
- Mating systems: Inbreeding. Kinship. Crossbreeding. Heterosis
- Uniparental and classical molecular markers
- Crosses and Heterosis
- Genomics, sequencing, GWAS
- Genealogy and segregation Analysis
- Breeder genotyping
- Paternity exclusion and DNA fingerprinting
- Animal Genetic Resources: characterization, conservation and management
- Selection: Breeding value. Heritability. Selection Response. Genetic parameters. BLUP. Genotype*environment interactions
- Selection programs in livestock species
- Group Work - article analysis



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Bibliography:

- NICHOLAS, F.W. (2010) - Introduction to Veterinary Genetics. 3rd Ed., Wiley-Blackwell
- NICHOLAS, F.W. (1989) - Veterinary Genetics. Oxford Univ. Press
- GAMA, L.T. (2022) - Melhoramento Genético Animal. 2nd Ed., Escolar Editora
- AJMONE-MARSAN, P. et al., eds. (2023) - Genomic characterization of animal genetic resources. FAO Animal Production and Health Guidelines No. 32.
- GRIFFITHS, A.J.F. et al. (2020) - An Introduction to Genetic Analysis. 12th Ed., WH Freeman and Co
- OLDENBROEK, K. et al. (2023) - Textbook Animal Breeding and Genetics for BSc students. The Netherlands and Animal Breeding and Genomics Centre
- KORF, BRUCE R. (2000) - Human Genetics - A Problem-Based Approach. 2nd Ed., Blackwell Science
- BOURDON, R.M. (2000) - Understanding Animal Breeding. 2nd Ed. Prentice Hall
- KHATIB, H. (2015) - Molecular and Quantitative Animal Genetics. Wiley-Blackwell
- Van VLECK, et al. (1987) - Genetics for the Animal Sciences. W.H. Freeman and Co.

Assessment:

The assessment of the theoretical component will be accomplished through a written examination including short answer / closed ended questions, multiple-choice questions (MCQ), true and false, missing words / incomplete sentences and 3% of constructed-response questions (CRQs) or open-ended questions.

The same written examination will include an evaluation of the practical component, namely with problem-solving questions.

The student evaluation is also important to assess the efficiency of the teaching-learning methodologies, in compliance with the UC objectives, and to allow future adequate adjustments on the teaching methodologies and/or on the assessment of student's knowledge and skills.

The article group work analysis, its presentation and discussion, will be assessed and valued at 25% of the final grade.

The final classification (CF) is obtained using the formula: $CF = 0.75 * \text{Written exam} + 0.25 * \text{Work group}$.