

Course Unit	Genetic Biotechnology			Field of study	Animal Science	
Master in	Technology and Animal Science			School	School of Agriculture	
Academic Year	2023/2024	Year of study	1	Level	2-1	ECTS credits 6.0
Туре	Semestral	Semester	1	Code	5026-810-1102-00-23	
Workload (hours)	162	Contact hours	T - Dectures; TP - Lectures a	- PL - T nd problem-solving; PL - Problem-	C - S - solving, project or laboratory; TC -	E · OT · O ·

Teresa Maria Montenegro Araújo A. Correia Name(s) of lecturer(s)

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to: The student should know the most recent techniques in genetic biotechnology and understand their applicability to Animal Science. Pay attention to the ethical part involved.

Prerequisites

Before the course unit the learner is expected to be able to: Students must have knowledge of genetics

Course contents

Knowledge of cytogenetics with application in animal production and health. Study of animal genomes and new genome editing technologies - CRISPR-cas9 Use of RNAi in functional genomics. Microbial metagenomics, new challenges in animal production. Practice

Development of basic molecular genetic protocols Research of genomic databases and data interpretation.

Course contents (extended version)

- 1. Cytogenetics

 - Chromosome constitution
 Different types of banding
 "In situ" hybridization
- Constitution and analysis of karyotypes of different animal species
 2. RNAi for improvement of animal breeding
 Mechanisms of RNAi

 - Pathways of RNA silencing
 - Transcriptional Posttranscriptional
- Transgenic expressing of RNAi-inducing molecules
 From gene to genomic. Genomic selection: a molecular tool for genetic improvement in animals
 Most used molecular markers in animal science

 - Real time-PCR
 - Next-generation sequencing
 Use of microarrays in animal breeding and animal health
- 4. Gene terapy

 - Viral and non-viral vectors Advantages and disadvantages Target tissues and applications in monogenic and polygenic diseases vaccines

- Vacuities
 Target genome editing
 New tools for genome editing CRISPR-Cas9
 Origin and mechanisms of CRISPR-cas9. Scientific advantages and applications
- Origin and mechanisms of CKSFK-Cass-Scientific advantages and applicat Ethical aspects
 Microbial metagenomics, new challenges in animal production
 Microbiome: intestinal, mammary gland and vagina
 Reconstructing the genomic content of microbial community from NGS data
- 7. Practical
- Extraction of DNA from diferente animal tissues
- PCR and electrophoresis Culture of microorganisms
- Interpretation and consultation of genomic databases

Recommended reading

- Barrango, R., Sontheimen, E., J.; Marraffini, L.A.; 2022. CRISPER Biology and Aplications. Americaqn Society for Microbiology. London, United Kingdom
 SuKanta Mondal and Ram LaKhan, 2021. Advances in Animal Genomics.ELSEVIER. London, United Kingdom
 Chowdhury, B., Garai, G., 2017 A review on multiple sequence alignment from the prespective of genetic algoritm. genomics 109, 419-431
 Array, J., 2010. Sistemas de informação para sistemas de microarry.Tese de Doutoramento. Universidade de Aveiro, Portugal.
 Iyle, Eid, J., Fehr, A., Gray, j., Iuong, k.J., Otto, G., Peluso, P., rank, D., et all., 2009.Real-time DNA sequencing from single polymerase molecules. Science 323 (5910), 133-138

Teaching and learning methods

Theoretical classes accompanied by media and multimedia.

Students will be encouraged to research some newer topics, checking the status of ART. At a practical level, laboratory classes will be held.

At the end, students will have to present an exhibition on a chosen topic

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Assessment methods

- Continuous evaluation (60% P+40%) (Regular, Student Worker) (Final, Supplementary)

 Intermediate Written Test 40% (Minimum score 8)
 Presentations 60% (Minimum score 9.5)

 General exame 100% (T/P) minimum score of 9.5 (Regular, Student Worker) (Final, Supplementary, Special)

 Final Written Exam 100% (Written exam (T/P). Minimum score 6).5)

Language of instruction

1. Portuguese 2. Spanish

Electronic validation								
Teresa Maria Montenegro Araújo A. Correia	Vasco Augusto Pilão Cadavez	Alfredo Jorge Costa Teixeira	Ramiro Corujeira Valentim					
18-01-2024	07-02-2024	08-02-2024	08-02-2024					