

**ACADEMIC YEAR 2023/2024**

General information	
Academic subject	<b>ANIMAL BREEDING AND ETHNOGRAPHY</b> Integrated exam of ANIMAL PRODUCTION I
Degree course	Animal Science L38
Academic Year	II year
European Credit Transfer and Accumulation System (ECTS)	6
Language	Italian
Academic calendar (starting and ending date)	I Semester: 02/10/2023 - 26/01/2024
Attendance	Mandatory

Professor/ Lecturer	
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Virtual headquarters	Microsoft Teams platform if necessary (Teams code: 6sd80hi)
Tutoring (time and day)	The teacher receives personally by agreement or via e-mail and Teams any day, except for institutional commitments.

Syllabus	
<b>Learning Objectives</b>	The course aims to provide the student with adequate knowledge of general and animal genetics, quantitative and population genetics. The main knowledge acquired will be the structure of the hereditary material, methods of transmission of characters in animals of zootechnical and veterinary interest, and main modifications of the hereditary material. The student will also acquire theoretical and practical knowledge elements aimed at developing and managing genetic selection strategies in the company with particular attention to advanced methods for estimating the genetic value of reproducers. Finally, suitable tools will be provided to understand the different methods of conservation of animal genetic diversity.
<b>Course prerequisites</b>	Principles of physiology and endocrinology of domestic animals. Knowledge of biochemistry, cell biology, basic statistics, and computer science
<b>Contents</b>	Check basic knowledge. <b>General genetics:</b> the discovery of hereditary material through the experiments conducted; organization of genetic material; the concept of splicing; cytogenetics and chromosomes; concepts of genomics; the nuclear and mitochondrial genome; the C value; the transmission of characters; genetic code and gene structure; notes on gene regulation and expression mechanisms; hints of epigenetics and methylation. <b>Mendelism:</b> Mendelism and its chromosomal bases; interaction between genes on different loci; modifier genes; co-dominance; incomplete dominance; dominant, recessive, and double epistasis; penetrance and expressiveness; pleiotropy; segregation and recombination of independent and associated genes (linkage); lethal genes; freemartins; associated genes; multiple allelism; heredity and sex: chromosomal determination of sex; sex-bound, restricted, and sex-influenced characters; Barr's body; genomic, chromosomal and gene mutations; hints on mitochondrial and Y chromosome heredity.

	<p><b>Population genetics:</b> concepts of population genetics: gene and genotype frequencies, Hardy-Weinberg equilibrium and the factors that influence it, similarity between individuals: kinship and consanguinity.</p> <p><b>Animal Breeding:</b> Quantitative characteristics, selection criteria, and objectives; population parameters and genetic effects, EBV estimation and simple genetic indices; response to selection; accuracy of the estimate; multi-trait; aggregated and combined indices; BLUP index, breeders' evaluation test; selection schemes; hints of genomic selection; heterosis and crossing.</p> <p><b>Ethnography:</b> bovine breeds (Frisona, Bruna, Pezzata Rossa, Jersey, Rendena, Valdostana, Reggiana, Bruna Originaria, Grigio Alpina, Modicana, Limousine, Charolaise, Chianina, Marchigiana, Romagnola, Podolica, Maremmana, Piemontese, Bianca Blue Belga, Angus, Herford, notes on zebuine breeds; sheep breeds (Sopravissana, Merinizzata it., Gentile di Puglia, Sarda, Comisana, Valle del Belice, Massese, Assaf, Lacaune, Lecce and Altamura, Appenninica, Suffolk, ile de France, Berrichonne du Cher, Bergamasca); goat breeds (Saanen, Camosciata, Garganica, Jonica, Maltese, Sarda, Valdostana, Valnerina); pig breeds (Duroc, Large white, Pietrain, Ladrance, Cinta Senese, Mora Romagnola, Pugliese); horse breeds (PSA, PSI, Lipizzaner, Trotter, Maremmano, Murgese, Haflinger, Pure Spanish Blood); Mediterranean buffalo; donkey breeds (Martina Franca; Romagnolo, Ragusano);</p> <p>Practice Function-type and economic genetics indices and the morpho-functional evaluation method. Practical use of population genetics information. Extraction and purification of nucleic acids</p>
<b>Books and bibliography</b>	<p>Book besides of lecture notes:</p> <p><b>Genetics:</b> Peter J. Russell, P. E. Hertz, B. McMillan, Elementi di Genetica;</p> <p><b>Animal Breedings:</b> G. Pagnacco, GENETICA ANIMALE - applicazioni zootecniche e veterinarie II edizione, Casa Editrice CEA</p> <p><b>Etnography:</b> lecture notes and Atlante delle razze autoctone. Bovini, equini, ovicapri, suini allevati in Italia. di Daniele Bigi, Alessio Zanon. Editore: Edagricole (available for consultation from the teacher).</p>
<b>Additional materials</b>	<ol style="list-style-type: none"> <li>There are several valid texts; the student is invited to consult the teacher to evaluate their usefulness.</li> <li>The slides and all the material provided by the teacher are available in the Teams channel of the course.</li> </ol>

<b>Work schedule</b>			
Total	Lectures	Hands-on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<b>Hours</b>			
<b>150</b>	<b>40</b>	<b>10</b>	<b>100</b>
<b>ECTS</b>			
<b>6</b>	<b>5</b>	<b>1</b>	
<b>Teaching strategy</b>	<p>Theoretical lessons will take place in the classroom, using a personal computer connected to a projector to show PowerPoint slides and explanatory videos simultaneously with the explanation. The practical lessons will take place in the laboratory for experiments with nucleic acids. Practical applications regarding Mendel's laws and population genetics or the interpretation of technical documents such as catalogs of reproducers will take place in the classroom. Tests of linear evaluation and other applications related to breeding practice will take place in livestock farms..</p>		

<b>Expected learning outcomes</b>	The skills acquired will be evaluated continuously during the course through questions and case studies related to the course. The learning outcomes covered are represented by:
<b>Knowledge and understanding on:</b>	Knowledge for the understanding of hereditary phenomena and the mechanisms of transmission and modification of genetic-based traits in the main zootechnical species. Knowledge of techniques for the genetic improvement of animals and of the different genetic types available on the market
<b>Applying knowledge and understanding on:</b>	Knowledge of the usefulness of knowing the hereditary mechanisms and implications for the zootechnical profession. Ability to act as a consultant in various professional realities.
<b>Soft skills</b>	Ability to identify the most suitable strategies for application in animals of zootechnical interest or in those of affection with particular attention to interactions with other disciplines, in particular, the ability to interact in a team will be of particular importance.

<b>Assessment and feedback</b>	
Methods of assessment	The skills acquired will be assessed towards the end of the course, through questions and practical exercises on topics related to the course. At the end of the course, the student must be able to:
Evaluation criteria	<ul style="list-style-type: none"> <li>• Knowledge and understanding: <ul style="list-style-type: none"> <li>○ Know the main transmission mechanisms of the characters and the biological basis behind these phenomena.</li> <li>○ Understand the different strategies for animal genetic improvement.</li> </ul> </li> <li>• Applied knowledge and understanding: <ul style="list-style-type: none"> <li>○ Identify the main problems related to the inheritance of traits and their application in the zootechnical and veterinary fields.</li> <li>○ Establish an adequate strategy against various problems in the zootechnical field using genetic improvement tools and the interpretation of hereditary phenomena.</li> </ul> </li> <li>• Autonomy of judgment: <ul style="list-style-type: none"> <li>○ Being able to express his opinion independently.</li> </ul> </li> <li>• Communication skills: <ul style="list-style-type: none"> <li>○ Good ability to present the proposed topics.</li> </ul> </li> <li>• Ability to learn: <ul style="list-style-type: none"> <li>○ Correct answers to the questions/topics proposed / I.</li> </ul> </li> </ul>
Criteria for assessment and attribution of the final mark	Verification of learning achieved takes place through an oral test. The mark is expressed out of thirty. The evaluations with the highest score are attributed to students who can use the correct scientific terminology and with good exposition skills. For the part of General Genetics and Population Genetics, an exemption is provided consisting of a written test consisting of multiple-choice questions and supplementary open-ended questions, aiming to ascertain the degree of knowledge of the proposed topics. The final mark of the integrated exam results from the arithmetic average of the marks obtained for each course. In any case, the student must acquire a mark greater than or equal to 18/30 for each part of the exam relating to the two courses of Animal Production I
<b>Additional information</b>	