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 COURSE: **ANIMAL GENETICS AND TRACEABILITY** SSD AGR/17
 

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ACADEMIC YEAR: **2018/19**TYPE OF EDUCATIONAL ACTIVITY: **CHARACTERIZING**TEACHER: **DI GREGORIO Paola**e-mail: **paola.digregorio@unibas.it**

website:

phone: **0039 0971 205030**

mobile (optional):

Language: **Italian**

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|---|--|---|----------------|
| ECTS:<br><b>8 CFU of Lesson</b><br><b>1 CFU of Exercise</b> | n. of hours:<br><b>64 hours of Lesson</b><br><b>16 hours of Exercise</b> | Campus: <b>Potenza</b><br>Dept./School: <b>School of Agricultural, Forest, Food and Environmental Sciences (SAFE)</b><br>Program: <b>Tecnologie Agrarie</b> | Trimester: III |
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 EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES
 

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## EDUCATIONAL GOALS

The goal of the course is to provide the basic principles of genetics, the knowledge of gene transmission in relation to significant characters in livestock, to provide information on the molecules at the base of hereditary transmission, to provide knowledge on the genetic traceability of animal products for both the fraud prevention and to increase the value of quality certification.

## EXPECTED LEARNING OUTCOMES

- **Knowledge and understanding:** the student must demonstrate that he/she possesses the knowledge and ability to understand: the transmission modes of simple Mendelian traits in livestock, the genetic molecules that are at the basis of hereditary transmission, the basic techniques and methods to be followed for genetic traceability of animal products;
- **Applying knowledge and understanding:** the student must be able, by applying the knowledge gained during the course, to design and support arguments to solve genetic problems such as: animal genotyping, mode of transmission of a trait, traceability of an animal product;
- **Making judgments:** The student must demonstrate that he/she possesses the ability to collect and interpret the data considered useful to determine autonomous judgments on the issues listed above;
- **Communication:** the student must be able to communicate, using appropriate language, the conclusions, the under-pinning knowledge and rationale, in the field of animal genetics and traceability, to specialist and non-specialist audiences;
- **Learning focus:** The student must be able, independently and using the knowledge gained during the course, to update and enrich his/her knowledge through the consultation of texts and/or scientific publications, computer tools, participation in courses and seminars in the field of animal genetics and traceability.

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 PRE-REQUIREMENTS
 

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Students must have acquired and assimilated the concepts about the structure of the cell provided by the course of "Botany" and the course "Anatomy and physiology of domestic animals"

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 SYLLABUS
 

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**BLOK 1 (8hours)** Structure and replication of the genetic material. Identification of DNA as the inherited genetic material. Chemical structure of nucleic acids. Double helix model of DNA. DNA replication. DNA polymerase.

**BLOK 2 (8hours)** Protein synthesis and genetic code: RNA transcription, Types of RNA, Genetic Code, protein synthesis. Regulation of gene expression.

**BLOK 3 (8hours)** Organization and transmission of hereditary material. DNA and chromosomes: single sequences and repeated sequences. Chromatin organization. Structure and morphology of eukaryotic chromosomes. Mitosis and cell division. Meiosis and gamete formation. Meiosis and recombination.

**BLOK 4 (8hours)** Mutations: gene mutations, Principal chromosomal mutation. Mendelian principles: Material and experimental methods.

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**BLOK 5 (8hours)** Wise Chi-square. Incomplete dominance and epistasis. Inheritance patterns of monogenic characters in livestock.

**BLOK 6 (8hours)** Association, exchange and genetic maps. The concept of association (linkage). Exceptions of independent assortment. Crossing-over and recombination of associated genes. Chromosomal mapping of associated genes. Map distance calculations by two and three points tests. Construction of genetic maps. Comparing genetic maps and physical maps.

**BLOK 7 (8hours)** Principles of: Southern Blot Hybridization (SBH), Polymerase Chain Reaction (PCR), microarray, DNA barcoding. Molecular markers. The Hardy-Weinberg law and its applications.

**BLOK 8 (8hours)** Traceability of animal products: Individual traceability, Breed traceability (meat products, milk products), Traceability of species.

**BLOK 9 (16hours exercises)** Composition and DNA replication, transcription of DNA into RNA, protein synthesis. Effect of mutations on protein synthesis. Production of gametes. Cross between individuals heterozygous at one or more loci, determining the F1 and F2. Transmission to offspring of dominant and co-dominant characters. Analysis of pedigree. Two and three points test, construction of gene maps. Analysis of the products of a PCR. Analysis of the digestion of a PCR product with restriction enzymes.

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### TEACHING METHODS

The course is organized as follows:

- Theoretical lessons (64 ore);
- Classroom and Laboratory tutorials (16 ore)

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### EVALUATION METHODS

Oral examination.

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### TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- G. Barcaccia, M. Falcinelli - Genetica e genomica Vol I GENETICA GENERALE, Liguori (anche e-book)
- G. Barcaccia, M. Falcinelli - Genetica e genomica Vol III GENOMICA E BIOTECNOLOGIE GENETICHE (capitolo 17), Liguori
- AJF Griffiths et al. - GENETICA, Zanichelli
- International Journal Articles.
- Course notes

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### INTERACTION WITH STUDENTS

At the beginning of the course, after describing the objectives, program and evaluation methods, the professor provides students educational materials (shared folders, website, etc). Simultaneously, she collects a list of students who intend to enroll in the course (name and e-mail).

Tutorial hours:

Mondays from 9:30 to 12:30; Tuesdays and Wednesdays from 15:30 to 17:30; always at the professor's study.

In addition to weekly reception, the professor is available at all times for a contact with the students, through her e-mail.

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### EXAMINATION SESSIONS (FORECAST)<sup>1</sup>

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|---------------|----|----------------|----|---------------|----|
| February 2019 | 15 | June 2019      | 14 | November 2019 | 15 |
| March 2019    | 15 | July 2019      | 19 | December 2019 | 13 |
| April 2019    | 12 | September 2019 | 13 | January 2020  | 17 |
| May 2019      | 17 | October 2019   | 18 | February 2020 | 14 |

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SEMINARS BY EXTERNAL EXPERTS YES  NO

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### FURTHER INFORMATION

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<sup>1</sup> Subject to possible changes: check the web site of the Teacher or the Department/School for updates.

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Examination board: Chairman prof. PAOLA DI GREGORIO

Member prof. ANDREA RANDO

Substitute member prof. ADRIANA DI TRANA

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