28410 - Genetics

Información del Plan Docente

Academic Year	2016/17
Academic center	105 - Facultad de Veterinaria
Degree	451 - Degree in Veterinary Science
ECTS	6.0
Course	2
Period	First semester
Subject Type	Basic Education
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

Learning process designed for this subject is based on....

The theoretical knowledge of principal concepts of Genetics, but also on their practical applications to livestock species. Planned practice are intended to put in touch with reality by means of observation and direct handling of genetic material, both in laboratory and in field.

5.2.Learning activities

28410 - Genetics

1. Theoretical sessions.

Presential hours: 30.

Non-presential hours: 45.

Teaching and learning methodology:

Masterclass. Masterclass is complemented by graphics and schemes from PowerPoint presentations and development of ideas on the blackboard. Previously, graphic material is at the disposal of the students from both ADD and Copying Service of the Faculty. Students questions and discussions about genetic subjects are encouraged.

2. Laboratory sessions.

Presential hours: 16.

Non-presential hours: 0.

Teaching and learning methodology: Practical activities consist of conducting an experiment about genetic analysis during eight two-hour sessions in the student laboratory of the Area of Genetics and in the Computer classroom. Each student will elaborate a laboratory booklet about session's methodology and answer to teacher's questions.

3. Problems sessions.

a) Sessions in the classroom for the two groups of students.

Presential hours: 12.

Non-presential hours: 18.

Teaching and learning methodology:

Problems relative to subjects exposed during theoretical sessions (one hour/week). Collections of problems are at the disposal of the students from both ADD and Copying Service of the Faculty. The teacher solves several problems, as examples for improving student's comprehension of genetic subjects.

b) Problems for the students' teamwork.

Non-presential hours: 13.

Teaching and learning methodology:

28410 - Genetics

Problems different to those solved in classroom are given in advance to students' teamworks. At the end of course, every student in these teamworks will participate in a public session for the presentation, discussion and resolution of the problems, where all teachers involved in problems sessions will be present.

4. Seminars.

Presential hours: 2.

Non-presential hours: 10.

Teaching and learning methodology:

Public presentation of works elaborated bystudents' teamworks. Complementary activity for dealing with subjects not taught previously.

Table summary of teaching-learning activities

ACTIVITY	PRESENTIAL HOURS	FACTOR	NON-PRESENTIAL HOURS *	TOTAL
Theoretical sessions	**30**	**1.5**	**45**	**75**
Problems sessions in classroom	**12**	**1,5**	**18**	**30**
Laboratory and computer sessions	**16**	**-**	**-**	**16**
Seminars	**2**	**5.0**	**10**	**12**
Evaluations	**-**	**-**	**4**	**4**
Problems for the students' teamwork	**-**		**13**	**13**

28410 - Genetics

Total	**60**	**1.5**	**90**	**150**

- **According to regulations of the Universidad de Zaragoza**

Summary of hours of student dedication for each activity

Activity	Hours
Presential (Theoretical , problems and laboratory sessions, seminars)	**60**
Authorized non-presential (Evaluations)	**4**
Non-presential (personal study, bibliographic consultation)	**86**

Total: 150 hrs

5.3.Program

Theoretical sessions' program:

- BLOCK 1. **STRUCTURE AND ORGANIZATION OF THE HEREDITARY MATERIAL (1 week).**

Theme 1. Nature of the hereditary material.

Theme 2. Replication.

GENETIC TRANSMISSION (2 weeks).

Theme 3. Chromosome theory of inheritance.

Theme 4. The mendelism as a genetic consequence of meiosis and fertilization.

Theme 5. Complex mendelism. Applications in the detection and diagnosis of diseases of genetic origin in livestock species.

28410 - Genetics

Theme 6. Inheritance and Sex. Applications in the detection and diagnosis of diseases of genetic origin in livestock species.

- BLOCK 2. **LINKAGE AND RECOMBINATION (1 + ½ weeks).**

Theme 7. DNA recombination..

Theme 8. Linkage analysis of eukaryote genes. Double recombination. Complete linkage.

Theme 9. Recombination in prokaryotes. Gene structure.

KNOWLEDGE OF THE GENOME (1 week).

Theme 10. Making genetic and physic maps of livestock species.

Theme 11. Gene maps in prokaryotes. Bacterial and viral mechanisms that allow the development of gene maps.

- BLOCK 3. **CHANGES IN HEREDITARY MATERIAL (3 weeks).**

Theme 12. Chromosome mutations. Structural variations of chromosomes.

Theme 13. Chromosome mutations. Numerical variations of chromosomes.

Theme 14. Chromosome abnormalities in livestock species and consequences on animal production and breeding.

Theme 15. Gene mutations. Applications in the detection and diagnosis of diseases of genetic origin in livestock species.

Theme 16. Mitochondrial DNA.

REPAIR OF HEREDITARY MATERIAL (½ week).

Theme 17. DNA repair.

- BLOCK 4. **REGULATION AND CONTROL OF GENE EXPRESSION (3 weeks).**

Theme 18. Transcription. RNA maturation.

Theme 19. Translation, protein synthesis and gene code.

DEVELOPMENTAL GENETICS (½ week).

28410 - Genetics

Theme 20. Development genetics.

- BLOCK 5. **GENE BIOTECHNOLOGY (1 + 1/2 weeks).**

Theme 21. Recombinant DNA technology.

Theme 22. DNA analysis. Applications to animal production , improvement and breeding.

- BLOCK 6. **POPULATION GENETICS (3 weeks).**

Theme 23. Basic concepts about population genetics. Characterization of populations.

Theme 24. Deviation from Hardy-Weinberg equilibrium I: systematic factors.

Theme 25. Deviation from Hardy-Weinberg equilibrium II: dispersive force.

Laboratory sessions' program:

Session 1. Cytological basis of inheritance, observation and identification of phases of the cell cycle.

Session 2. Fundamental of immunogenetics for kinship testing. Applications to control of stud books.

Session 3. Sex diagnosis by DNA testing in livestock species.

Session 4. Chromosome abnormalities in livestock species. Karyotipes.

Session 5. Cell culture.

Session 6. Mutagenesis. Detecting DNA modifications.

Session 7. Restriction maps. Cloning and subcloning of DNA sequences by using several softwares.

Session 8. Study of gene variation by electrophoretic techniques. Estimation of genotype and allele frequencies. Hardy -Weinberg equilibrium in a population.

Problems sessions' program:

1. Monohybridism. Crosses between lines differing in a single character. Dominant and non-dominant genes.

2. Complex mendelism. Lethal genes.

3. Analysis of genealogies.

4. Sex-linked inheritance.

5. Linkage and recombination.

6. Linked genes and gene maps in eukaryotes.

7. Gene maps in prokaryotes.

8. Structural chromosome abnormalities.

9. Variations of chromosome number.

10. Gene characteristics of populations and Hardy-Weinberg equilibrium.

11. Changes in allele frequencies I.

12. Changes in allele frequencies II.

5.4.Planning and scheduling

Dates and key milestones of the subject are described in detail, along with the rest of the subjects of the second course in the degree of veterinary medicine, on the website of the Facultad de Veterinaria (link: http://veterinaria.unizar.es/gradoveterinaria/). This link will be updated at the beginning of each academic year.

5.5.Bibliography and recomended resources

http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a