28909 - Biology

Información del Plan Docente

Academic Year	2016/17
Academic center	201 - Escuela Politécnica Superior
Degree	437 - Degree in Rural and Agri-Food Engineering
ECTS	6.0
Course	1
Period	Second 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

The learning process that is designed for this subject is based on the following:

The course is oriented basic character, so the proposed activities are focused on understanding and assimilation of the main foundations of biology, basic for future professionals of Agricultural Engineering and Rural Environment.

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The overview of the knowledge acquired in master classes is complemented with practical activity laboratory, where the student shall demonstrate the methods and analysis used and knowledge of application.

For better monitoring of the learning process it is favored individual tutorials.

5.2.Learning activities

The program that the student is offered includes the following activities ...

Theoretical classroom sessions
The beginning of each subject, the teacher provides students with the theoretical content and the relevant literature class, according to the theoretical Program of the subject, leaving the rest for non-contact work of the student.

Laboratory practices
Before starting the practice period the student will have a practical guide, which includes fifteen practical sessions as well as preliminary information on the submission of the reports shall include in your lab notebook.

Tutoring sessions
These sessions are individually developed, in order to advise the student and resolve the doubts that may arise in the study of the subject.

5.3.Program

Theory

15 sessions (30 classroom hours) in which the following themes will be studied:

A) Molecular genetics

1- The genome. Levels of organization. The prokaryotic genome and organular genomes. The nuclear eukaryotic genome: sizes, structure, function. Repetitive DNA's and simple copy and low copy DNA's. Genes and genetic families.

2- Replication of the DNA. Fundamentals and mechanism of replication. The replisome. Repairing the DNA and mutations by substitution. Mutagenic agents.

3- Transcription of DNA to RNAs (Ribonucleic acids). Mechanisms of transcription. The maturing of the eukaryotic RNAs. Post-transcriptional alterations. Packaging of the ribosomal sub-units.

4- Translation. Characteristics of the genetic code. Variations of the code. Protean synthesis into prokaryotes and eukaryotes. Mechanisms and cellular location.

5- Mechanisms of regulation of the genetic expression. Regulation of the transcription in prokaryotes: cascade of sigma factors, operon. Regulation of the transcription in eukaryotes: heterochromatization. Editing function of the RNA messenger.

B) Reproduction

6-The eukaryotic cellular cycle. Phases of division and interphase. Mitotic cellular division. Cellular division in animals and plants. Mitotic mutagenes. Meiotic cellular division. Meiotic divisions I and II: phases and mechanisms. Genetic meaning of meiosis: recombination and chromosomal reduction in gametogenesis.

7- Sexual reproduction in animals. Spermatogenesis and oogenesis. Hormonal control of gametogenesis. Fertilization.

8- Sexual reproduction in plants. The flower. Formation of gametophytes and masculine and feminine gametes. Pollination.

9- Self-incompatibility. Asexual reproduction: vegetative reproduction and apomixes. The agamic complex.

C) Physiology and Metabolism

10- Animal and plant development. Embryogenesis (blastulation, gastrulation, neurulation). Genetic and hormonal control of animal development.

11- Development of the seed. Dormancy and germination. Plant hormonal regulators. Photoreceptors.

1 2- Photosynthesis I. Photosynthetic pigments. Photochemistry of the reactions of electronic transport. Photophosphorylation.

13- Photosynthesis II. Fixation of CO2 and synthesis of carbohydrates. Metabolic routes C3, C4 and CAM. Photosynthetic rates. Alterations of photosynthesis in the face of diverse stresses.

14- Physiology and metabolism of nitrogen. Bacterial fixation of N2. Symbiosis with nitrogen fixers. Absorption of nitrate and reductions of nitrate and nitrite in plants. The agronomic importance of nitrogen assimilation in plants.

D) Ecology

15- Ecology. Ecology of populations. Exponential and logistic models of the growth of populations. Ecology of ecosystems. Ecologic succession. Flow of energy, structure and trophic levels of the ecosystem. Overexploitation of natural resources.

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Practicals

15 sessions (30 classroom hours) in which the following themes will be studied:

1- Concepts of microscopy: optical and electron microscopy.

2- Electron microscopy: interpretation of electron slides of animal and plant tissue.

3- Observation of eukaryotic cells: the animal cell and the plant cell.

4- Observation and identification of plastids.

5- Cultivation and identification of bacteria. The Gram technique. Sporing bacteria and nitrogen-fixing bacteria.

6- Observation of fungal structures. Recognition of fungi.

7- The genetic code.

8- Mitosis. Observation of the mitotic phases.

9- Elaboration of karyotypes.

10- Meiosis. Observation of the meiotic phases.

11- Sexual reproduction and the embryonic development in animals and higher plants. Observation of gamete cells of animals and plant gametophytes. Observation of the embryonic development in animals and plants.

12- Enzyme activities I. Hydrolytic enzymes. Detection of enzymatic activity of invertase and amylase.

13- Enzyme activities II. Plant defences against phytophages. Breakdown of cyanogenic glycosides.

14- Extraction and separation of photosynthetic pigments.

15- Photosynthesis: the Hill reaction.

5.4.Planning and scheduling

Calendar for attended sessions and presentation of works

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It is estimated that an average student should devote to this subject, 6 ECTS, a total of 150 hours or so, which should encompass both classroom activities and non-attendance.
With this allowance the student weekly charge, in hours, is reflected in the following schedule:

Activity Type / week

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Classroom activity										
Teory	2	2	2	2	2	2	2	2	2	2
Practices			2	2	2	2	2	2	2	2
Evaluation										
Activity distnace										
Individual work	4	4	5	5	5	5	5	5	5	5
TOTAL	**6**	**6**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**

Activity Type / week	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	Total
Classroom activity										**66**
Teory	2	2	2	2	2					30

Practices	2	2	2	2	2	2	2			30
Evaluation								2	4	6
Activity distnace										**84**
Individual work	5	5	5	5	5	4	4	3		84
TOTAL	**9**	**9**	**9**	**9**	**9**	**6**	**6**	**5**	**4**	**150**

5.5.Bibliography and recomended resources

BB	Biología de Vile[e] / Eldra Pearl Solomon ... [et al.] ; traducción: Roberto Palacios Martínez . 4a ed. México [etc.] : McGraw-Hill Interamericana, cop. 1998
BB	Curtis, Helena. Biología / Helena Curtis ; N. Sue Barnes ... [et al.]. 7ª ed. en español Buenos Aires [etc] : Editorial Médica Panamericana, 200
BB	Freeman, Scott. Biología / Scott Freeman . 3a. ed. Madrid : Pearson Educación, 2009
BB	Vida : la ciencia de la biología / William K. Purves ... [et al.] . 6a ed. Buenos Aires [etc.] : Editorial Médica Panamericana, 2003
BC	Berg, Jeremy M.. Bioquímica / Jeremy M. Berg, John L. Tymoczko, Lubert Stryer ; contenidos web de Neil D. Clarke. . - 5a ed. Barcelona [etc.] : Reverté, D.L. 2003.
BC	Biología molecular de la célula / Bruce Alberts ... [et al.] ; traducido por Mercé Dufort i Coll, Miquel Llobera i Sande . 4ª ed. Barcelona : Omega, cop. 2004
BC	Evolución / Theodosius

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	Dobzhansky...[et al.] ; [traducido por Montserrat Aguadé] . [1a ed., 3a reimp.] Barcelona : Omega, 1993
BC	Fisiología y bioquímica vegetal / coordinación, J. Azcón- Bieto, M. Talón . 1a ed. Nueva York [etc.] : Interamericana-McGraw-Hill, 1993
BC	Fontdevila Vivanco, Antonio. Introducción a la genética de poblaciones / Antonio Fontdevila, Andrés Moya Madrid : Síntesis, DL 1999
BC	Margulis, Lynn. Cinco reinos : guía ilustrada de los phyla de la vida en la Tierra / Lynn Margulis, Karlene V. Schwartz ; [traducción de Ana Avila] . 1a ed. Barcelona : Labor, 1985
BC	Tamarin, Robert H.. Principios de genética / Robert H. Tamarin ; [versión española por Alfredo Ruiz ... (et al.)] . Barcelona [etc.] : Reverté, D.L. 1996