

25201 - Biology

Información del Plan Docente

Academic Year	2016/17
Academic center	201 - Escuela Politécnica Superior
Degree	571 - Degree in Environmental Sciences 277 - Degree in Environmental Sciences
ECTS	6.0
Course	1
Period	First Four-month period
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. The proposed activities are focused on understanding and assimilation of the main foundations of Biology and knowledge of Biodiversity.

5.2. Learning activities

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The program includes the following activities ...

Theoretical classroom sessions

At the beginning each topic provides the student the theoretical content according to the theoretical Subject program, leaving the rest for non-contact work of the student.

Lab practices

Before starting the practice period the student will have a guide practices, including the fifteen practical sessions he has to perform in the laboratory, as well as preliminary information on the submission of reports shall include in your lab notebook.

Tutoring sessions

These 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 hours of class) in which the following subjects will be studied:

A) Molecular Genetics

1. The genome. Levels of organization. The prokaryotes genome and organulars genomes (mitochondial and cloroplasts). Eukaryote nuclear genome: sizes, structure, evolution. Repetitive DNAs and simple or low copy DNA. Genes and family genetics.
2. DNA replication. Fundamentals and mechanisms of the replication. Replisome. DNA repair and mutations due to substitution. Mutagenetic agentes.
3. Transcription of DNA to RNA. Transcription mechanisms. Maturing process of ANN eukaryotes. Posttranscriptional alterations. Packing of ribosomal subunits.
4. Translation. Characteristics of the genetic code. Variations the code. Protein synthesis in prokaryote and in eukaryotes. Mechanisms and cellular localization.
5. Regulation mechanisms of genetic expression. Regulation of transcription in prokaryotes: the cascade of Sigma factors, operon. Regulation of transcription in eukaryotes: heterochromatinization of DNA. Editing function of ANN messenger.

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B). Reproduction and development

6. The eukaryote cell cycle. Phases of cell division and interphase. Mitotic cell division. Cell division in animals and vegetables. Mitotic mutagen. Mitotic cell division. Mitotic divisions I and II (meiosis I and II): phases and mechanisms. Genetic significance of meiosis: recombination and chromosome 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 masculine and feminine gametophyte and gametes. Pollination.
9. Self-incompatibility. Seed development. Dormancy and germination. Asexual reproduction: vegetative reproduction and apomixis. Agamic complexes.
10. Animal development. Embryogenesis (blastulation, gastrulation, neurulation). Determining and differentiating embryonic cells. Genetic and hormonal control of animal development.
11. Plant development. Regulating hormones: Auxins, Cytokinins, Gibberellin, Abscissic acid and Ethylene. Photoreceptors: Phytochrome.

C). Inheritance

12. Laws of inheritance. Phenotype y genotype. Mendelism. Principle of Uniformity of F₁, Principle of Segregation, Principle of Independent Assortment. Genetic bases of the laws of Mendelism). Test Cross. Mendelian tests with multiple genes.
13. Non-Mendelian heredity. Variations of dominance (codominance) Pluri-allelism. Genetic interaction: Epistasis. Genetic linkage. Sex linkage. Pleiotropy. cytoplasmatic inheritance.
14. Hereditary Variation: chromosomal alterations and ploidy levels. Chromosomal deletion, inversions y translocation. Diploidy, aneuploidy, and polyploidy. Homoploid hybrids. Non-hybrid polyploidy (Autopolyploidy). Hybrid polyploids (Allopolyploidy). Inheritance in polyploidys. Evolutionary, ecological and economic importance of polyploid plants.

D). Evolution

15. Evolution. Darwin's Theory of Evolution. Speciation. Biological species. Anagenesis and cladogenesis. Allopatric and sympatric speciation. Speciation by hybridization. Microevolution and macroevolution population. Phylogenetic reconstructions. Natural phenomena such as continental drift, extinction and adaptive radiation.

LABORATORY PRACTICALS

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5 sessions (30 hours of class) in which the following subjects will be studied:

- 1- Concepts of microscopy: Optical and electronic microscopy.
- 2- Electronic microscopy: Interpretations of electronographies of animal and vegetable tissue.
- 3- Observing eukaryotic cells: animal cells and plant cells.
- 4- Observing and identifying plastids.
- 5- Cultivation and identification of bacteria. Gram's method. Sporulating bacteria and nitrogen-fixing bacteria.
- 6- Observing fungal structures. Identifying fungi.
- 7- DNA isolation.
- 8- The genetic code.
- 9- Mitosis. Observing the phases of mitosis.
- 10- Producing karyotypes.
- 11- Meiosis. Observing the phases of meiosis.
- 12- Sexual reproduction and embryonic development in animals and higher plants. Observing gamete cells of animals and plants gametophytes . Observing the embryonic development in plants and animals.
- 13- Mendelian Genetic Problems
- 14- Non Mendelian Genetic Problems I
- 15- Non Mendelian Genetic Problems II

5.4.Planning and scheduling

Timetable sessions and presentation of works

It is estimated that a student must devote to this subject, 6 ECTS, a total of 150 hours. The weekly charge of the student, in hours, is reflected in the following schedule:

Classroom activity

<i>Lab practices</i>	2	2	2	2	2	2	2	2
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<i>Individual work</i>	4	4	5	5	5	5	5	5	5	5
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<i>TOTAL</i>	6	6	9	9	9	9	9	9	9
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Activity Type / week	11	12	13	14	15	16	17	18	19	Total
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Classroom activity 66

<i>Teory</i>	2	2	2	2	2		30
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<i>Lab practices</i>	2	2	2	2	2	2	2	30
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<i>Evaluation</i>								2	4	6	
Distance activity											84
<i>Individual work</i>	5	5	5	5	5	4	4	3			84
TOTAL	9	9	9	9	9	6	6	5	4		150

5.5. Bibliography and recommended resources

BB	Curtis, Helena. Biología / Helena Curtis ; N. Sue Barnes ... [et al.]. 7ª ed. en español Buenos Aires [etc.] : Editorial Médica Panamericana, 2008
BB	Freeman, Scott. Biología / Scott Freeman . 31ª ed. Madrid : Pearson Educación, 2009
BB	Solomon, Eldra Pearl. Biología / Eldra Pearl Solomon, Linda R. Berg, Diana W. Martin . 5a ed. México [etc.] : McGraw-Hill Interamericana, cop. 2001
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 Dobzhansky...[et al.] ; [traducido por Montserrat Aguadé] .

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[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

Graur, D., Li, W.-H. (1999). Fundamentals of molecular evolution (2nd. ed.). Sunderland: Sinauer Associates

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

Network Resources

Will be posted on the web (Moodle ADD) basic reference material as the Subject program, teaching guide, summaries of the theoretical issues, scripts practices or different material.