

SYLLABUS

TITLE:	Biology and Society
CODE:	BIO 109
PREREQUISITE:	N/A
CREDITS:	3 credits 45 hours contact 1 term

DESCRIPTION

In this course, we will discuss the importance of scientific knowledge for the analysis and understanding of new discoveries and their applications to personal and collective life. Also, the principles that govern the nature of science, its methodology and the reliability of the knowledge it produces are discussed. It starts from Biology as a science that studies life, which characterizes it and the risks that threaten the balance systems of the individual and of the ecosystems. It provides the future professional with a broad, comprehensive and reliable perspective of the importance of supporting their positions with arguments of scientific validity. The course consists of lectures and class discussions, integrating laboratory experiences related to the topics covered. This course is aimed to non-Natural Sciences students as part of their general training.

JUSTIFICATION

New scientific knowledge is generated every day as a result of the great boom that research and development of technology has had in recent years. Scientific knowledge translates into new options for individuals and their environment and survival as a species. The knowledge gained about the material of life, DNA, allows us to better understand its behavior, which, in turn, has opened a world of new possibilities through the application of genetic engineering technologies. This has led to the emergence of new controversies such as the genetic manipulation of much of the food we consume, the use of embryonic stem cells for therapeutic purposes and the application of various assisted reproduction options. It is essential that in its integral development the student learns to cultivate their intellect and that through the application of inquisitive processes, inherent to the nature of science, they will be able to apply them in the search for answers to problems of their daily life. New knowledge and new technologies and their

applications lead to the emergence of situations of an ethical nature that require people with greater critical capacity while contributing to the enrichment of their cultural values and the conservation and better use of their natural resources.

COMPETENCES

The course develops in the student the following competences:

- **Critical Thinking**
- **Research and exploration**
- **Communication**

OBJECTIVES

At the end of the course, students will be trained to:

1. Apply the inquisitive processes inherent to the nature of science in the solution of scientific and contemporary problems.
2. Understand and explain the impact of urban techno-development on human beings and nature, in order to stimulate a personal and social attitude of responsibility and commitment.
3. Know the model of the DNA molecule structure, its operation and how genetic engineering allows its manipulation.
4. Determine the role and importance of genetic material by analyzing the life cycle in animals.
5. Critically evaluate the ethical implications of the manipulation of genetic material.
6. Analyze the expression of genetic material in the determination of some characteristics in humans.
7. Critically analyze the influence of biotechnology on the quality of life in society and its impact on ecosystems.

CONTENT

- I. Introduction
 - A. Scientific Thought in Modern Biology
 1. Nature of science
 2. The inquiry process
 - B. Scientific methodology
 1. Case analysis

- a. Flies in dairy
 - 1) Application of the inquiry process
 - 2) The mechanism of natural selection in the evolution of species
 - b. Others
 - 1) Eating disorders
 - 2) Drugs
 - 3) Cholesterol
 - C. Diversity of Life
 - 1. Characteristics of life
 - 2. Systematics
 - a. Domains
 - 1) Eukaryotes
 - 2) Prokaryotes
 - a) Archaeobacteria
 - b) Eubacteria
 - b. Kingdoms
 - 1) Viruses
- II. Biotechnology
 - A. The DNA molecule
 - 1. Your discovery
 - 2. Structure
 - 3. Function and importance - genes / genome
 - 4. Chromosomes
 - B. DNA and the Life Cycle of Animals
 - 1. Importance of the processes of fertilization, mitosis and meiosis
 - C. Genetic engineering
 - 1. Applications in agriculture
 - 2. Biomedical Applications
 - D. Assisted reproduction
 - 1. IVF
 - 2. Surrogate mothers
 - 3. Gamete donation
 - E. Human Genome Project
 - F. Biotechnology and eugenics
 - G. Bioethics and reflections on ethical dilemmas
- III. Basic principles of genetics
 - A. Patterns of inheritance applied to inheritance in humans

1. Mendelians
 2. Post-Mendelian
 - a. Polygenes
 - b. Multiple alleles
 - c. Codominance
 - B. Genetic abnormalities in humans
 1. Chromosomal
 2. Mutations
- IV. Ecology and Environmental Problems
- A. Ecosystems
 1. Energy flow in ecosystems
 - a. Food chains
 2. Circulation of nutrients in ecosystems
 3. Terrestrial and aquatic ecosystems in Port
 - a. "Bosque Estatal de Piñones"
 - B. Conservation of the environment
 1. Greenhouse effect and global warming
 2. Acid rain
 3. Desertification
 4. Environmental problems in Puerto Rico
 - a. Energy
 - b. Water quality
 - c. Solid waste
 - 1) Recycling
 - d. Urban development / urban sprawl
 - C. Environmental ethics

LABORATORY EXPERIENCES

- A. Scientific Method
- B. Use and handling of the microscope
- C. Organisms in Pond Water
- D. Construction of the DNA molecule
- E. DNA extraction
- F. Construction of a Karyotype
- G. Field Trip

METHODOLOGY

The following strategies of the active learning methodology are recommended:

- Inquiry method
- Guiding questions
- Case studies
- Problem-based learning
- Collaborative learning
- Field Trip
- Forums
- Construction of concept maps
- Analysis questions

EVALUATION

Participation	10%
Partial Jobs	40%
Oral presentations	20%
Project or exam (final)	25%
Immersion experience	<u>5%</u>
Total	100%

LEARNING ASSESSMENT

The institutional assessment rubric is applied to the core activity of the course.

BIBLIOGRAPHY

TEXTBOOK

Audesirk, T., & Audesirk, G., Byer, B. (2017). *Biología: La vida en la tierra* (10ma. ed.).
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Essencial Biology* (6ta ed.) Pearson.

Freeman, S., Allison, L., Black, M., Podgorski, Quillin, K., Carmichael, J., Taylor, E.,
(2019, Feb 16). *Biological Science* (7th ed.). Pearson.

Simon, E., (2019, Feb 7). *Biology: The Core* (3th ed.). Pearson.

Solomon, E., Martin, C., Berg, L., & Martin, D. (2018). *Biology* (11th ed.). Cengage Learning.

ELECTRONIC REFERENCES

Acid rain. (2019, Mar 19). In *Encyclopedia Britannica*. <http://www.britannica.com/EBchecked/topic/3761/acid-rain>

DNA. (2019, Nov 21). In *Encyclopedia Britannica*.

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Genetics. (2020, Feb 4). In *Encyclopedia Britannica*. <http://www.britannica.com/EBchecked/topic/228936/genetics>

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Find more information resources related to the course topics on the library page <http://biblioteca.sagrado.edu/>

REASONABLE ACCOMMODATION

To obtain detailed information on the process and the required documentation, you must visit the corresponding office. To guarantee equal conditions, in compliance with the ADA (1990) and the Rehabilitation Act (1973), as amended, all students who need reasonable accommodation services or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

ACADEMIC HONESTY, FRAUD AND PLAGIARISM

Any student who misses the policy of honesty, fraud and plagiarism is exposed to the following sanctions: received a grade of zero in the evaluation and/ or repetition of the work in the course, grade of F (*) in the seminar: suspension or expulsion as established in the Academic Honesty Policy document (DAEE 205-001) effective August 2005.

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