

## SCHOOL OF HEALTH AND SCIENCES

### SYLLABUS

<b>TITLE:</b>	General Biology II
<b>CODE:</b>	BIO 112
<b>PREREQUISITE:</b>	BIO 111
<b>CO-REQUISITE:</b>	BIO 112L
<b>CREDITS:</b>	4 credits   45 contact hours   30 lab hours   1 term

### DESCRIPTION

This course has an approach that allows the formation and integral development of the student of the Natural Sciences program. The principles of population genetics and evolution, the classification of plants and animals, the comparative study of organic systems in animals, and the structure and function in plants, ecology, and tropical ecosystems are studied. The course includes theory and practice.

### JUSTIFICATION

The fundamental concepts discovered by researchers in the field of Biology and their applications in different areas of knowledge affect all aspects of mankind's contemporary life. Recent advancements in the field of Biology, especially Biotechnology, have been astounding and impactful. Research in this field has culminated in organ grafting, in vitro fertilization, cloning, and the production of insulin and interferon via genetic engineering. To be able to understand and evaluate these findings in an intelligent way, as well as other problems of common interest in today's world such as environmental contamination, population control, protection of flora and fauna, and the effects of the use and abuse of drugs and alcohol, among others, require knowledge in Biology. It is essential that in the training and integral development of the student, the basic knowledge is acquired that allows him or her to understand the world of living organisms in which he or she develops and relates to.

## COMPETENCES

The course develops the following competences in students:

- **Critical questioning**
- **Research and exploration**

## OBJECTIVES

After completion of the course, students will be able to:

1. Identify factors related to evolutionary phenomena and the origin and extinction of species.
2. Know the scientific classification of plants and animals.
3. Compare the diversity of structures and functions and know the general characteristics of the main taxonomic groups of plants and animals.
4. Analyze the interrelationships of organisms in ecosystems.
5. Identify the ecological principles in the conservation of Puerto Rico's ecosystems.
6. Identify problems in the field of biology that have social, economic, ethical, and moral implications.

## CONTENTS

- I. Population Genetics
  - A. Evolution
  - B. Population
  - C. Speciation
    1. Reproductive isolation
  - D. Hardy-Weinberg Principle
- II. Taxonomy
  - A. Importance
  - B. Main categories
    1. Domains
      - a. Bacteria
      - b. Archaea
      - c. Eucarya
    2. Protists
    3. Kingdoms
      - a. Fungi
      - b. Plantae
      - c. Animalia

- C. Binomial nomenclature

### III. Animal Diversity

Comparative evolutionary study from porifera to chordate.

- A. Classification criteria

- B. Digestive system

- C. Circulatory system

- D. Lymphatic system

- E. Immune system

- F. Respiratory system

- G. Excretory system

- H. Nervous system

- I. Endocrine system

- J. Reproductive system

### IV. Plant Diversity

- A. Classification criteria

- B. Development

- C. Algae, moss, liverwort

- D. Vascular plants

### V. Ecology

- A. Basic principles

- B. Energy flow

- C. Networks and communities

- D. Nutrient recycling

- E. Biomes

- F. Tropical ecosystems

- 1. Mangroves

- 2. Dry forest

- 3. Rainforest

- 4. Reefs

## LABORATORY EXPERIENCES

- A. Natural selection

- B. Taxonomy

- C. Digestive system

- D. Circulatory system

- E. Respiratory system

- F. Excretory system
- G. Coordination system
- H. Animal reproductive system
- I. Plant diversity
- J. Plant reproduction
- K. Ecology
- L. Visit to ecosystems in Puerto Rico (Piñones and El Yunque forests)

## **METHODOLOGY**

The following strategies from the active learning methodology are recommended:

- Lectures
- Question method
- Incorporation of web tools
- Study of virtual images
- Audiovisual resources (video, presentations, simulations)
- Research Based Learning – RBL
  - Discussion
  - Field visits
  - Lab exercises
  - Independent use of WEB 2.0 (Blog and Mi Sagrado)
  - Individual or group written reports

## **EVALUATION**

Participation	10%
Partial assignments	40%
Final project or exam	25%
Immersion experience	25%
<b>Total</b>	<b>100%</b>

## **LEARNING ASSESSMENT**

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

## BIBLIOGRAPHY

### TEXTBOOK

Solomon, E.P., Martin, C.E., Martin, D.W., Berg, L.R. (2019). *Biology* (11<sup>th</sup> ed.)  
Cengage Learning.

Lab: Biology professors. (1999). *Manual de Laboratorio BIO 112*. Universidad del  
Sagrado Corazón.

### REFERENCES

Barraclough, T.G. (2019). *The evolutionary biology of species*. Oxford University Press.

Katano, W., Moriyama, Y., Takeuchi, J. K., & Koshiba-Takeuchi, K. (2019). Cardiac  
septation in heart development and evolution. *Development, Growth &*  
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Mitchard, E. T. A. (2018). The tropical forest carbon cycle and climate change. *Nature*,  
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Paps, J. (2018). What Makes an Animal? The Molecular Quest for the Origin of the  
Animal Kingdom. *Integrative and Comparative Biology*, 58(4), 654–665. Advance  
online publication. <https://doi.org/10.1093/icb/icy036>

Sousa, A. M. M., Meyer, K. A., Santpere, G., Gulden, F. O., & Sestan, N. (2017).  
Evolution of the Human Nervous System Function, Structure, and Development.  
*Cell*, 170(2), 226–247. <https://doi.org/10.1016/j.cell.2017.06.036>

Stork, N. E. (2018). How Many Species of Insects and Other Terrestrial Arthropods Are

There on Earth? *Annual Review of Entomology*, 63, 31- 45.

<https://doi.org/10.1146/annurev-ento-020117-043348>

Thornhill, D. J., Howells, E. J., Wham, D. C., Steury, T. D., & Santos, S. R. (2017).

Population genetics of reef coral endosymbionts (Symbiodinium, Dinophyceae).

*Molecular Ecology*, 26(10), 2640– 2659. <https://doi.org/10.1111/mec.14055>

Wang, J. H., Li, Y., Deng, S. L., Liu, Y. X., Lian, Z. X., & Yu, K. (2019). Recent

Research Advances in Mitosis during Mammalian Gametogenesis. *Cells*, 8(6),

567. <https://doi.org/10.3390/cells8060567>

#### ELECTRONIC LINKS

<http://www.drna.pr.gov/documentos/el-manglar/>

<http://www.drna.pr.gov/programas-y-proyectos/proyecto-para-la-recuperacion-de-la-mariquita-de-puerto-rico/>

<https://bibliotecadeinvestigaciones.wordpress.com/biologia/la-evolucion-de-las-especies/evolucion-de-los-mamiferos/>

<https://www.elsevier.com/es-es/connect/ciencia/las-claves-de-la-genetica-de-las-poblaciones>

<https://es.khanacademy.org/science/biology/her/evolution-and-natural-selection/a/darwin-evolution-natural-selection>

For more information resources related to the course's topics, access the library's webpage <http://biblioteca.sagrado.edu/>

#### REASONABLE ACCOMMODATION

For detailed information on the process and required documentation you should visit the corresponding office. To ensure equal conditions, in compliance with the ADA Act (1990) and the Rehabilitation Act (1973), as amended, any student in need of reasonable accommodation or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

## **ACADEMIC INTEGRITY**

This policy applies to all students enrolled at Universidad del Sagrado Corazón to take courses with or without academic credit. A lack of academic integrity is any act or omission that does not demonstrate the honesty, transparency, and responsibility that should characterize all academic activity. Any student who fails to comply with the Honesty, Fraud, and Plagiarism Policy is exposed to the following sanctions: receive a grade of zero in the evaluation and / or repetition of the assignment in the seminar, a grade of F (\*) in the seminar, suspension, or expulsion as established in the Academic Integrity Policy effective in November 2022.

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