SAGRADO
Universidad del Sagrado Corazón

SYLLABUS

TITLE: General Biology II

CODE: BIO 112

PREREQUISITE: BIO 112L

CREDITS: 4 credits | 45 hours contact | 30 hours of laboratory | 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 in this course. This course includes theory and laboratory practices.

JUSTIFICATION

The fundamental concepts discovered by researchers in the field of biology and their applications in different areas of knowledge, affect all aspects of contemporary human life. Advances in the field of Biology in recent years have been dizzying and of great impact. Research in this field has culminated in organ grafting, in vitro fertilization, the establishment of clones, the production of insulin and interferon by genetic engineering. In order to intelligently understand and evaluate these discoveries and other problems of common interest in today's world such as environmental pollution, population control, protection of flora and fauna, the effect of the use and abuse of drugs and alcohol, among others, knowledge of biology is required. It is essential that in the training and integral development of the student, acquire the basic knowledge to understand the world of living organisms in which develops and relates.

COMPETENCES

The course develops in the student the following competences:

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

OBJECTIVES

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

1. Identify the factors related to the evolutionary phenomenon 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 the ecosystems of Puerto Rico.
6. Identify problems in the field of biology that have social, economic, ethical and moral implications.

CONTENT

I. Population Genetics

   A. Evolution
   B. Population
   C. Speciation
      1. Reproductive isolation
   D. Hardy-Weinberg principle

II. Taxonomy

   A. Importance
   B. Main Categories
   C. Binomial Nomenclature
      1. Kingdoms
         a. Animal
         b. Vegetable
         c. Fungi

d. Protista
e. Eubacteria
f. Archaea

III. Animal Diversity: Comparative evolutionary study from poriferous to chordates

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, Mosses and Liverworts
D. Vascular Plants

V. Ecology

A. Basic Principles
B. Energy Flow
C. Networks and Communities
D. Nutrients Recycling
E. Biomes
F. Tropical Ecosystems
    1. Mangrove
    2. Dry Forest
    3. Rain Forest
    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 ecosystem of P.R. (Piñones Forest and El Yunque Tropical Forest)

METHODOLOGY

The following strategies of the active learning methodology are recommended:

- Conference
- Question method
- Incorporation of Web tools
- Virtual image studio
- Audiovisual resources: video, presentations, simulations
- Research Based Learning-RBL / Research Based Learning-ABI
    - Discussion
    - Field visits
    - Laboratory exercises
    - Independent use of WEB 2.0 (Blog and Mi Sagrado)
    - Individual or group written reports

EVALUATION

Participation	10%
Partial jobs	40%
Final project or exam	25%
Immersion experience	25%
TOTAL	100%

LEARNING ASSESSMENT

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

BIBLIOGRAPHY

TEXTBOOK

Solomon, Berg, M. (2019). *Biology,* (12 th ed.). Saunders College Publishing.

Profesores de Biología, 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 & Differentiation, 61*(1), 114–123. https://doi.org/10.1111/dgd.12580

Mitchard, E. T. A. (2018).The tropical forest carbon cycle and climate change. *Nature, 559*(7715), 527–534.https://doi.org/10.1038/s41586-018- 0300-2

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., Ho.wells, 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 REFERENCES

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

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.