

## SCHOOL OF HEALTH AND SCIENCES

### SYLLABUS

|                     |                                                      |
|---------------------|------------------------------------------------------|
| <b>TITLE:</b>       | General Botany                                       |
| <b>CODE:</b>        | BIO 230                                              |
| <b>PREREQUISITE</b> | BIO 112                                              |
| <b>CORREQUISITE</b> | BIO 230L                                             |
| <b>CREDITS:</b>     | 4 credits   45 contact hours   45 lab hours   1 term |

### DESCRIPTION

This course is an introduction to plant biology. The course studies plant structure, function, metabolism, physiology, genetics, modes of reproduction, development, ecology, and economic value. Taxonomic principles, origin, and biodiversity of plants are discussed. The discussion of topics is supported by local examples and species. The course provides students with the fundamental and holistic knowledge about plants.

### JUSTIFICATION

Plants are primary producers of oxygen and sugars, fixers of carbon dioxide, and food source for innumerable species. Plants provide us with the raw materials for many products needed in modern life and industrial processes such as: wood for construction, fuel, fibers for the textile industry, pulp for papermaking, and bioactive chemicals used in the pharmaceutical industry. Knowledge about plants has made it possible to select species suitable for different uses and to develop varieties that are pest-resistant and that provide high-yields.

### COMPETENCES

The course develops the following competences in students:

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

## **OBJECTIVES**

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

1. Understand the importance of plants and their study.
2. Know the structure and function of tissues, organs, and types of plant cells.
3. Describe the processes of transport and metabolism in plants.
4. Know the fundamental concepts about physiological processes and genetics of plants.
5. Understand the origin, evolution, and phylogenetic relationships among plant biodiversity.
6. Describe the main characteristics and life cycles of various plant groups.
7. Understand the principles of plant ecology including their relationship with the environment and their interaction with other organisms.

## **CONTENTS**

- I. Introduction
  - A. Botany and the importance of plants
  - B. The role of plants in society
  - C. Products, areas of innovation and research in botany
- II. Structure and Function of Plant Tissue and Organs
  - A. The plant cell
  - B. Meristems, mitosis, and meiosis
  - C. Morphology and anatomy of organs, tissues, and types of cells
  - D. Types of growth in plants
- III. Transport and Metabolism
  - A. Movement of water, osmosis, and transpiration
  - B. Energy flow
  - C. Photosynthesis and photorespiration
  - D. Diversity of secondary metabolic products and their applications
- IV. Plant Physiology
  - A. Phytohormones and their role in plant development
  - B. Phototropism and gravitropism
  - C. Plant nutrition
- V. Principles of Genetics and Reproduction in Plants
  - A. Alternation of generations and genetics

- B. Meiosis, genetic variability, and mutations
- C. Asexual reproduction in plants
- D. Biotechnology and genomics
- VI. Origin and Evolution of Plants
  - A. Natural selection
  - B. Speciation
  - C. Origin of species and plants
- VII. Plant Diversity
  - A. Taxonomy and classification
  - B. Cyanobacteria, protists, and algae
  - C. Kingdom Plantae and its modes of reproduction
    - 1. Bryophytes
    - 2. Seedless vascular plants
    - 3. Gymnosperms
    - 4. Angiosperms
- VIII. Principles of Plant Ecology
  - A. Food webs
  - B. Interactions between plants and their environment
    - 1. Climate change
  - C. Interactions between plants and macroorganisms
    - 1. Pollinators
    - 2. Dispersers
    - 3. Pests
  - D. Interactions between plants and microorganisms
    - 1. Mycorrhiza
    - 2. Beneficial bacteria
    - 3. Pathogens
    - 4. Viruses
  - E. Plant conservation

## **METHODOLOGY**

The following strategies from the active learning methodology are recommended:

- Conferences that include the use of audio-visual resources

- Study trips
- Use of technological tools to study botany
- Presentations and/or preparation of posters
- Reading and analysis of scientific articles on topics in botany

## EVALUATION

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

## LEARNING ASSESSMENT

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

## BIBLIOGRAPHY

### TEXTBOOK

Evert, R.F., Eichhorn, S.E. (2013). *Raven biology of plants* (8<sup>th</sup> ed.). W.H. Freeman/  
Palgrave Macmillan.

Rushforth, R., Robbins, R., Crawley, J.L., & van de Graaff, K. (2016). *A Photographic  
Atlas for the Botany Laboratory* (7<sup>th</sup> ed.). Morton Publishing Co.

### REFERENCES

Acevedo-Rodríguez, P. (2003). *Bejucos y Plantas Trepadoras de Puerto Rico*.

Smithsonian Institution.

Liogier, A. H., Martorell, L. F. (2000). *Flora of Puerto Rico and Adjacent Islands: A  
Systematic Synopsis* (2<sup>nd</sup> ed.). Editorial UPR.

Little, E. L., Wadsworth, F. H., & Marrero, J. (2001). *Árboles Comunes de Puerto Rico y  
las Islas Vírgenes* (2<sup>nd</sup> ed.). Editorial UPR.

Núñez Meléndez, E. (1982). *Plantas Medicinales de Puerto Rico*. Editorial UPR.

Núñez Meléndez, E. (1990). *Plantas Venenosas de Puerto Rico*. Editorial UPR.

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 Student Affairs.

- Students participating in the Student Support Program (PAE, in Spanish) shall request their reasonable accommodation in PAE's offices.
- Students who do not participate in PAE shall request their reasonable accommodation at the Integral Wellness Center (*Centro de Bienestar Integral*, in Spanish).

## **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.

## **RESEARCH COURSES**

This course may require students to practice tasks related to the research process, such as taking informed consent or assent, administering instruments, conducting interviews, observations, or focus groups, among others. These assignments are part of an academic exercise and the information collected will not be used to share with third parties or disclose it in settings other than the classroom with the professor teaching the course. Every student, as well as their professor, who will interact with human subjects as part of their research practice must be certified in ethics with human subjects in research by the Collaborative Institutional Training Initiative (CITI Program).

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