

UNIVERSIDAD DEL SAGRADO CORAZÓN
NATURAL SCIENCE DEPARTMENT

SYLLABUS

COURSE TITLE: Introduction to Speleology
COURSE CODE: BIO 250
CREDITS: Three (3) credits, 45 hours

DESCRIPTION:

Speleology is the scientific study of caves. The course will cover all elements and basic aspects that comprise the study of caves. We will explore the underground world that makes up Puerto Rico's cave systems and illustrate it with local examples. We will discuss origins and mechanisms of formation, speleothems, physical, environmental and biological characteristics of the ecosystem, as well as, cave-dwelling species, investigation methods, socio-cultural aspects and the Puerto Rico's cave and sinkhole protection and preservations act (Law 111 of 1985), its status and current problems faced by conservation efforts. The course format is designed for the purpose of enabling the student to gain a reasonable understanding of the importance of caves while encouraging the interest in its study, protection and preservation.

JUSTIFICATION:

Puerto Rico is home to a varied and extraordinary subterranean world. Some 400 caves, distributed throughout 41 municipalities, have been currently identified. However, it is estimated that the total amount of caves could reach the 2,000 mark. These underground spaces serve as refuge for a very particular wildlife, are recipients and drainage for the groundwater flow, preserve evidence of ancient cultures and offer scenarios of singular beauty, thus constituting a rich source of study for different branches of science.

The scientific, cultural, scenic and recreational value of the caves demand special protection efforts from the government, private and civic sectors. The effective conservation of these resources requires, from decision makers and the population, a comprehensive knowledge about them. This course intends to communicate, from a scientific basis, the needed information about caves that will allow for the integration of conservation efforts.

COMPETENCES

Transversal competences

- Critical questioning (level II)
- Investigation (level II)

Specific competences

1. Recognize the diverse elements and basic concepts related to the scientific study of caves and their subterranean ecosystems.
2. Explain the geologic processes that determine cave formation.
3. Recognize the types of caves that can be found in Puerto Rico.
4. Recognize different types of pictographs and petroglyphs found in caves.
5. Explain patterns of water circulation and retention in caves.
6. Mention the most common animals in Puerto Rican caves and identify them as troglobites, troglophiles and troglaxenes.
7. Analyze Puerto Rico's cave legislation benefits and defects.
8. Analyze the possible usage of caves for scientific, instructional, recreational and tourism purposes.
9. Develop an appreciation for caves and promote their protection.

CONTENT

- I. Basic principles of speleology
 - A. Historic background
 - B. Importance of the study of caves
 - C. Related disciplines
- II. Origin and mechanisms of cave formation
 - A. Types of caves
 1. Dissolution caves
 - a) Meteoric
 - b) Interphasic
 2. Mechanical caves
 - B. Karst regions

- III. Physical characteristics
 - A. Geologic structure
 - B. Passageways distribution
 - C. Bodies of water

- IV. Speleothems and other deposits
 - A. Types
 - B. Formation mechanisms
 - 1. Precipitates
 - 2. Evaporites

 - C. Sediments
 - D. Collapses

- V. The subterranean environment
 - A. The subterranean atmosphere
 - B. The aquatic environment
 - C. Flow of energy
 - 1. Food chain

- VI. Cave fauna
 - A. Levels of adaptation
 - 1. Troglonemes
 - 2. Trogloniles
 - 3. Troglonites

 - B. Microorganisms
 - 1. Histoplasmosis

 - C. Invertebrates

 - D. Vertebrates
 - 1. Bats

- VII. Socio-Cultural aspects
 - A. Cave uses
 - 1. Rock art
 - 2. Recreation
 - 3. Commercialization

VIII. Investigation: Methods and techniques

- A. Collection of data
- B. Cartography
- C. Hydrology
 - 1. Dye tests
 - 2. Water quality
 - 3. Collection of organisms

IX. Protection and conservation

- A. Mechanisms
 - 1. Laws and regulations
 - a) Act 111 of 1985
 - 2. Education

X. Current condition and problems

- A. Distribution and abundance
- B. Land management and use
- C. Case studies

METHODOLOGY

Lectures and presentations with audiovisual material.
 Class discussion on themes and selected readings.
 Library investigations and reports.
 Field trips.

EVALUATION

Partial exams (2)	50%
Final exam	30%
Assignments, summaries and reports	15%
Participation and attendance	5%
	Total	100%

BIBLIOGRAPHY

Text

Moore, G. W. & G. N. Sullivan, 1997. Speleology, Caves and the Cave Environment. Cave Books, St. Louis, MO.

References

- Conde-Costas, C. 2000. “Relación entre los Atributos Físicos de una Cueva y el Area donde Ubica” – “Particularidades del Ecosistema Cavernícola”. Seminario del Recurso Cuevas: Aspectos y Consideraciones Relevantes al Proceso Evaluativo y Decisional. Seminarios Tierra Linda, Publicación Serie STL 00-1.
- Conde-Costas, C. and C. Gonzalez. 1996. Distribution, Abundance and Habitat Characterization of the Troglobitic Groundwater Shrimp Typhlatya monae, P. R. Tierra Linda Consultores Inc. Report for the U.S. Fish and Wildlife Service, 97 p.
- Conde-Costas, C. y Gonzalez, C. 1990, “Las Cuevas y Cavernas en el Bosque Xerofítico de Guánica”, Acta Científica, 4(1-3):113-126.
- Culver, D.C. 1982. Cave Life: Evolution and Ecology. Harvard University press, Cambridge, Massachusetts.
- Gannon, M.R; A. Kurta, A.R. Duran & M. Willig. 2005. Bats of Puerto Rico: an island focus and a Caribbean perspective. Texas Tech University Press, Texas, USA.
- Giusti, Ennio V. 1978. Hydrogeology of the Karst of Puerto Rico. U.S. Geological Survey Professional Paper 1012, 65p.

Electronic References

Espeleorevista – www.cuevaspr.org

Sociedad Espeleológica de Puerto Rico – www.sepri.org – www.mundosubterraneo.org

Madre María Teresa Guevara Library is directly subscribed to COBIMET Consortium data bases that include books, documents, magazine and newspaper articles and other resources that offer information related to the topics explored in this course. To use the data bases follow these instructions:

1. enter the following electronic address in your browser:
<https://portal.sagrado.edu>
2. enter your username and password
3. look for and select the symbol for *Biblioteca Virtual*; use the accessed page to search for information and Access the data base

REASONABLE ACCOMMODATION

Any student in need of special services or assistance should present a request with the Associate Dean for Student Affairs at the beginning of the course, as soon as you determine the need, but no later than the third week of classes.

ACADEMIC INTEGRITY, FRAUD AND PLAGIARISM

Any student found lacking academic integrity, engaging in fraud or plagiarism could be subject to the following sanctions: “0” in their course evaluation and/or will be required to repeat the failed course work; an “F” in the course; suspension or expulsion as established in the Academic Integrity Policy document, number DAEE 205-001 effective August 2005.

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