UNIVERSIDAD INTERAMERICANA DE PUERTO RICO
Faculty of Sciences and Technology
Department of Natural Sciences

Syllabus

I. TITLE OF THE COURSE : Modern Biology II

Code and number	: BIOL 1102
Credits	: three (3)
Academic Term	:
Professor	:
Office hours	:
Office Telephone	:
Office/lab	:
Email	:

II. DESCRIPTION

Study of genetic processes. It includes cell division, Mendelian and molecular inheritance, gene expression and fundamental concepts of development. Discussion of the concepts of ecology and evolution. Prerequisite: BIOL 1101.

III. OBJECTIVES

After completing the course, students will:

1. Compare the stages of cell division in meiosis, their role in the process of sexual reproduction and genetic variation.
1.1 Differentiate between mitosis and meiosis in terms of processes and products.
1.2 Recognize the differences between meiosis I and meiosis II.
1.3 Describe the process of gametogenesis and its role in sexual reproduction.

2. Valuing the Mendelian laws that serve to explain the mechanisms involved in the inheritance.
Explain the basic concepts of Mendel's laws and how they apply to genetic crosses.
Illustrate monohybrid and dihybrid crosses using Punnett square.
Recognizing the phenomenon of incomplete dominance and analyze its effect on the progeny.
Identify specific cases of codominance, multiple alleles, and inheritance to chromosome X.

3. Relacionar la expresión del material genético con las etapas del desarrollo.

3.1 Definir fecundación y segmentación
3.2 Señalar las etapas de la formación del embrión.
3.3 Distinguir entre los conceptos de totipotencialidad y pluripotencialidad.
3.4 Identificar las capas embrionarias: ectodermo, mesodermo, y endodermo.
3.5 Distinguir entre los términos de determinación y diferenciación.

4. Analyze the perspectives related to evolutionary processes.
4.1 Recognize the contributions of Lamarck, Darwin and Wallace.
4.2 Identify the contributions of the genetic basis of natural selection and the evolutionary process.
4.3 Recognize the contributions of genetics, geology and other sciences to the theory of evolution.
4.4 Explain the evolutionary processes.
4.5 Describe the main events of the geological scale.

5. Explain biodiversity as a result of evolution.
5.1 Define the term biodiversity
5.2 Describe the main taxonomic criteria.
5.3 Discuss the two main methods of systematic study.

6. Apply the basic concepts of ecology to current environmental problems.
6.1 Define ecology
6.2 Define ecosystem
6.3 Explain the ecological interactions such as commensalism, mutualism, parasitism, predation.
6.4 Explain the concepts of ecological niche and ecological succession.
6.5 Explain the major environmental problems worldwide.

IV. CONTENT

A. Cell division, growth and development
1. Stages of meiosis
2. Comparison of mitosis and meiosis in terms of processes and products
3. Differences between meiosis I and meiosis II, focusing on the contribution of each of these stages in gametogenesis

B. Mendelian inheritance and the mechanisms involved

1. Mendel's laws: their effects on the genetic cross and their progeny
    a. Law of Segregation
    b. Law of Independent Sweepstakes
2. Genetic Crosses
    a. Punnett square
    b. monohybrid crosses
    c. dihybrid crosses
    d. genotypic and phenotypic ratio
    3. Semidominancia
    4. Codominancia
    5. Incomplete Dominance
    6. Multiple alleles
    7. X-linked inheritance

C. Genética molecular
    1. Chromosomal Basis
    2. Structure and function of nucleic acids
    3. DNA replication
    4. Transcription of DNA: formation of mRNA
    5. Translation of mRNA: protein formation.
    6. Regulation of gene expression.
    7. Mutations and their possible effect on the body.

D. D. Genes and Development
    1. Basic concepts of development
    2. Growth
    3. Differentiation
    4. Morphogenesis
    5. Inductive interactions during organogenesis.
    6. totipotentiality
    7. Induction during development
    8. Cloning carrot.

E. The prospect of organic evolution
    1. The statements of Lamarck, Darwin and Wallace
    2. Evolutionary processes: chemical evolution, genetic basis, the first natural selection cells.
    3. Evidence of organic evolution:
    a. geologic record
    b. fossil record
    c. anatomical analogies and homologies
    d. embryonic development
    4. Microevolución
    5. Speciation and macroevolution
    6. Biodiversity
    a. systematic
    b. general characteristics of the Realms

F. The principles of ecology.

1. Interactions between organisms and their environment
2. Features and functions of ecosystems
3. Global Ecological Problems

V. TEACHING STRATEGIES

This is a list of suggested teaching strategies for the course:

Lectures by Professor A.
B. Laboratory Experiences
C. Discussion of readings and supplementary items
D. Self
E. Collaborative work
F. Videos

Using Total Quality strategies and "Assessment":

A. Self-evaluation (A, CT)
B. Exercises reflection (A)
C. "One minute paper" (A)
D. Cooperative learning (A, CT)
E. Summarize in a sentence (A)
Group work F. (A)
G. Brainstorming (A)

VI. SUGGESTED EVALUATION

A.	Three partial tests	300 puntos

	Total	300 puntos

VII. TEXTBOOK

Urry, Cain, Wasserman, Minorsky Jackson & Reece. 2014. Campbell Biology in Focus. Pearson, Benjamin Cummings.

VIII. BIBLIOGRAPHY

Diccionario de Biología. 2006. Colombia. Editorial Norma.

Joglar, R. 2005 *Biodiversidad de Puerto Rico*. PR Editorial del Instituto de Cultura Puertorriqueña.

López, A. 2002. *Atlas de ecología de Puerto Rico*. Puerto Rico. Editorial Cordillera.

Pearl, E., Solomon et al. 2001. *Biología.* México. Mc Graw Hill Interamericana.

Vidal, J. 2001. *El mundo de la ecología.* España. Editorial Océano.

IX. RESOURCES IN INTERNET

Basic concepts in Ecology

http://ccollege.hccs.cc.tx.us/instru/physci/geo/cate/enviro/ESCh4.htm
www.fi.edu/tfi/units/life/habitat/habitat.html
www.netusa1.net/~gwmager/Ecosystem.html
www.bradwoods.org/eagles/ee.htm
www.princeton.edu/~howarth/202/ethic.html
http://plato.stanford.edu/entries/ethics-environmental/
www.ew.govt.nz/ourenvironment/indicators.../p2c/report.htm
www.lancs.ac.uk/users/philosophy/mave/guide_1.htm

X. SPECIAL NOTES

1. Auxiliary Services or Special Needs

Students who require special assistance or auxiliary services should apply them to the course or as soon as acquire knowledge of need, through the Office of Professional Counselor, Mr. Jose Rodriguez, located in the Program College Counseling Office (111).

1. *Honradez, fraude y plagio*

Dishonesty, fraud, plagiarism and other inappropriate behavior in relation to academic work constitute major infractions sanctioned by General Student Regulations. Major infractions, as provided in General Student Regulations may result in suspension from the University for a definite time over one year or permanent expulsion from the University, among other penalties.

2. Use of Electronic Devices

Cell phones and other electronic devices that could interrupt the teaching and learning process or disrupt a milieu for academic excellence will be deactivated. Critical situations will be addressed as appropriate. The use of electronic devices that allow access, store or send data during tests or examinations is prohibited.

Rev.: Nov. 2014