University of Puerto Rico
Mayagüez Campus
College of Arts and Sciences
Department of Biology

FACE TO FACE COURSE SYLLABUS

COURSE SYLLABUS

GENERAL INFORMATION:

COURSE TITLE:	Genetics
ALPHANUMERIC CODIFICATION:	Biol 3300
CONTACT HOURS / CREDITS	30 contact hours/3 credits
PREREQUISITES, COREQUISITES AND OTHER REQUIREMENTS:	BIOL 3022 or BIOL 3052 or BIOL 3435 or BIOL 4015 or CIBI 3032 or CIBI 3002

COURSE DESCRIPTION:

ENGLISH: Study of nuclear and non-nuclear organisms; their nature and the transmission and mode of action of genetic material." Lecture and laboratory are combined into a single course which covers important components of classical molecular and population genetics. Genetics is a required course for majors in the Biology Department and many Agricultural majors as well. This course will provide the basis upon which the student may build in other courses, or in real-life situations. In the laboratory, the student will prepare slides of mitosis, identify the stages of mitosis and meiosis, extract DNA, transform bacteria, induce mutations with UV irradiation, use restriction enzymes, conduct electrophoresis, paper chromatography, and PCR, apply analytical methods using probabilities and Chi-square tests of significance. They will also analyze pedigrees, karyotypes, and gene frequencies in populations. They will also use representative data bases and discuss relevant ethical problems. This is a face-to-face course.

SPANISH: Estudio de organismos nucleares y no nucleares; su naturaleza y la transmisión y modo de acción del material genético." La conferencia y el laboratorio se combinan en un solo curso que cubre componentes importantes de la genética molecular clásica y de poblaciones. Genética es un curso obligatorio para estudiantes de la carrera de Biología y también para muchos estudiantes de carreras de Agricultura. Este curso proporcionará la base sobre la cual el estudiante podrá construir en otros cursos o en situaciones de la vida real. En el laboratorio, el estudiante preparará láminas de mitosis, identificará las etapas de la mitosis y la meiosis, extraerá ADN, transformará bacterias, inducirá mutaciones con irradiación UV, usará enzimas de restricción, llevará a cabo electroforesis, cromatografía en papel y PCR, aplicará métodos analíticos

usando probabilidades y pruebas de significancia Chi-cuadrado. También analizarán genealogías, cariotipos y frecuencias génicas en poblaciones. Además, utilizarán bases de datos representativas y discutirán problemas éticos relevantes. Este es un curso presencial.

LEARNING OBJECTIVES:

At the end of the course students will be able to:

a. Use the principles of chromosome transmission to predict patterns of inheritance.
b. Evaluate scientific data using the rules of probability.
c. Understand how the structure of DNA enables it to function as genetic materia
d. Explain the relationship between genotype and phenotype.
e. Understand the molecular basis of mutation, and its role in genetic variation.
f. Explain how the genetic code enables protein synthesis to be directed by genetic information.
g. Understand how genomes are replicated, repaired, organized and packaged.
h. Describe the modes of gene regulation in prokaryotes and eukaryotes.

SUGGESTED TEXTBOOK:

1. Concepts of Genetics 12th edition by Klug, Cummings, Spencer, Palladino and Killian
2. Genetics A conceptual Approach 6th/7th edition Benjamin A. Pierce
3. Introduction to Genetics by Natasha Ramroop Singh (Read/download here: Introduction to Genetics – Simple Book Publishing (tru.ca))

COURSE OUTLINE AND TIME DISTRIBUTION:

2 hours of lecture / 3 hours of lab

CONFERENCE TOPIC	TIME DISTRIBUTION (HOURS)
I. Course introduction; Basic introduction to Genetics	1
II. Introduction to Mendelian genetic	2
III. . Mendel's first experiments and first law; Single locus genetics and monohybrids	2
IV. Mendel's second experiments and second law; double loci genetics and dihybrids	1
V. Incomplete dominance and codominance	1
VI. Epistasis, polygenes, multiple alleles	2
VII. Linkage and recombination	2
VIII. Genetics of sex determination in mammals; sex linkage	3
IX. Abnormalities in human sex determination	2
X. Gene regulation in prokaryotes and viruses	3
XI. Gene regulation in eukaryotes	4
XII. Gene technology and molecular analysis of genes	4
XIII. Final Exam	3
TOTAL CONTACT HOURS	**30**

LABORATORY TOPIC	TIME DISTRIBUTION (HOURS)
I. Introducción, Reglas de Seguridad, Instrumentación, Técnicas asépticas y Bioseguridad	3
II. Cromosomas y División Celular: Mitosis y Meiosis	3
III. Base Molecular de la Herencia Extracción ADN Manihot esculenta	3
IV. Transformación de células bacterianas	3
V. Cambios en la Estructura Génica y Control Genético Mutagenesis con luz ultravioleta en Saccharomyces cerevisiae	3
VI. La Ley de Probabilidad y Prueba de Significancia (Parte I)	3
VII. La Ley de Probabilidad y Prueba de Significancia (Parte II)	3
VIII. Técnicas Moleculares Modernas I. Marcadores genéticos y PCR de Manihot esculenta	3
IX. Técnicas Moleculares Modernas II. Enzimas de Restricción: Digestión de fago lambda	3
X. Técnicas Moleculares Modernas III. Geles	3
XI. Genética Humana. Cromosomas Humanos, cariotipos y análisis de Pedigrí	3
XII. Evaluation	6
TOTAL CONTACT HOURS	**39**

INSTRUCTIONAL STRATEGIES:

Some of the following may be used:

☒ Lectures	☐ Project Based Learning
☒ Discussion	☐ Seminars or Workshops
☐ Cooperative Learning	☒ Problem Based Learning (PBL)
☐ Case Studies	☐ Flipped Classroom
☐ Lectures with Guest Speakers	

MINIMUM OR REQUIRED RESOURCES AVAILABLE:

RESOURCE	FACE-TO-FACE
Classroom or laboratory	Institution
Account in the institutional learning management platform (e.g. Moodle or Blackboard)	Institution
Institutional email account	Institution
Computer with high-speed internet access or mobile device with data service	Student
Programs or applications: word processor, spreadsheets, presentation editor	Student

Webcam or mobile with camera and microphone	Student
Integrated or external speakers	Student
Whiteboard	Institution
Digital projector	Institution

Other: N/A

ASSESSMENT TECHNIQUES:

Assessment Technique	Relative Weight
☒ Class participation/attendance	5%
☒ Final Exam	30%
☒ Assignments	5%
☒ Quizzes	27%
☒ Laboratory	33%
Total:	**100%**

Standard scale: 89 to 100 A; 79 < 89 B; 70 < 79 C; 60 < 70 D; < 60 F

REASONABLE MODIFICATION (REASONABLE ACCOMMODATION):

The University of Puerto Rico (UPR) acknowledges the right of students with disabilities to an inclusive, equitable, and comparable post-secondary education. In accordance with its policy toward students with disabilities, based on federal and state legislation, every qualified student with disabilities is entitled to equal participation in those services, programs, and activities that are physically, mentally or sensorially natured and have thus substantially affected one or more major life activities, such as their area of post-secondary studies. They have the right to receive reasonable accommodation or modifications. If you require accommodation or reasonable modification in the course, you must inform the professor without the need to disclose your condition or diagnosis. Simultaneously, you should promptly request the Office of Services for Students with Disabilities (OSEI) of the unit or campus for your need for modification or reasonable accommodation.

The University of Puerto Rico at Mayagüez (RUM) recognizes that each student has an inherited right to request reasonable accommodation according to Law 51: Law for Integral Educational Services for People with Disabilities. Every student has the right to receive reasonable accommodation if he/she presents the necessary evidence to be evaluated by the Office of Services to Students with Disabilities (OSEI-RUM), and the related information can be found at the following link: https://www.uprm.edu/cms/index.php/page/85. If your case is approved by OSEI-RUM, you will receive reasonable accommodation in your courses and evaluation, and you must contact each professor for course registered. For additional information contact OSEI-RUM at the Office of the Dean of Students, DE 12, via telephone 787-832-4040 extensions 6734 or 6735, email: oseirum@uprm.edu, at the virtual office: https://meet.google.com/yvd-nrqo-mor, or join by telephone: (US)+1 475-558-0169 PIN: 814 895 818#.

ACADEMIC INTEGRITY:

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Section 6.2 of the UPR General Student Regulations (Certification No.13, 2009-2010, Board of Trustees) provides that academic dishonesty includes, but is not limited to: "fraudulent actions, obtaining grades or academic degrees by false or fraudulent simulations, copying all or part of another's academic work, copying all or part of another's answer to questions on an examination, taking or having another take any oral or written test or examination on behalf of another, and aiding or facilitating another person to engaging such conduct." Any of these actions will be subject to disciplinary sanctions in accordance with the disciplinary procedure provided in the UPR General Student Regulations in force. To ensure the integrity and security of user data, all hybrid, distance-learning and online courses shall be offered through the institutional learning management platform or through tools required by the course, which uses secure connection and authentication protocols. The system authenticates the user identity using the username and password assigned through the student institutional account. The user is responsible for keeping secure, protecting, and not sharing their password with others.

POLICY AND PROCEDURES FOR MANAGING SEX AND GENDER-BASED DISCRIMINATION AT THE UNIVERSITY OF PUERTO RICO:

The Policy and procedures for managing Sex and Gender-Based Discrimination at the University of Puerto Rico, Certification No. 107 (2021-2022) of the Governing Board, certifies that the University of Puerto Rico, as an institution of higher learning and a workplace, safeguards the rights and offers a safe space for those who interact therein, whether they be students, employees, contractors, or visitors. It seeks to promote an environment that respects diversity and the rights of the university community. This policy provides a protocol for handling situations related to the following prohibited conduct in the workplace or in the academic setting: discrimination based on sex, gender, pregnancy, sexual harassment, sexual violence, domestic violence, dating, violence, and stalking.

DIVERSITY, EQUITY, AND INCLUSION

The University of Puerto Rico is committed to establishing an environment that values diversity, promotes equity and equality, and aspires to the full inclusion of its entire university community. Courses will be offered in an inclusive and equitable environment, ensuring the participation of students with diverse backgrounds, experiences, and abilities. Thus, the University of Puerto Rico reiterates its dedication to upholding the principles of diversity, equity, and inclusion in its academic programs.

CONTINGENCY PLAN IN CASE OF AN EMERGENCY OR INTERRUPTION OF CLASSES

In the event of an emergency or interruption of classes, the professor will contact the students through the institutional email or other available means to coordinate the continuity of the course.

The contingency plan must preserve the modality in which the course was created and programmed in the course offering.

Certification 23-29 of the Academic Senate establishes that a face-to-face course may have up to 25% of the hours at a distance and if necessary, this option may be used.

GRADING SYSTEM

☒ Quantifiable (letters, A, B, C, D, F) ☐ Not Quantifiable (Pass, Fail)

BIBLIOGRAPHY:

4. **Concepts of Genetics 12th edition by Klug, Cummings, Spencer, Palladino and Killian**
5. **Genetics A conceptual Approach 6th/7th edition Benjamin A. Pierce**
6. **Introduction to Genetics by Natasha Ramroop Singh** (Read/download here: Introduction to Genetics – Simple Book Publishing (tru.ca))

Electronic resources:

1. Khan Academy - https://bio.libretexts.org/Bookshelves/Genetics/Classical_Genetics_(Khan_Academy)
2. Helpful resource simplifying certain principles we will discuss -> https://learn.genetics.utah.edu/