

**INTER AMERICAN UNIVERSITY OF PUERTO RICO
METROPOLITAN CAMPUS
SCHOOL OF SCIENCE AND TECHNOLOGY
NATURAL SCIENCE DEPARTMENT
MASTER'S IN SCIENCE IN MOLECULAR MICROBIOLOGY**

SYLLABUS

I. GENERAL INFORMATION

Course Title	:	Molecular Diagnostic Techniques in Microbiology
Code and number	:	MOMI 6332
Credits	:	3
Academic term	:	
Instructor	:	
Office hours and location	:	
Office telephone	:	
E-mail	:	

II. DESCRIPTION

Application of molecular techniques in the detection, identification, and characterization of microbial pathogens of clinical forensic importance. Evaluation of the automation processes of molecular techniques. It requires 30 hours of lecture and 45 hours of closed laboratory.

III. OBJETIVES

It is expected that at the end of the course, the student will be able to:

1. Demonstrate knowledge of the different molecular methodologies designed for the quantification and identification of microorganisms.
2. Use the main molecular tests; among which are distinguished those that detect differences or mutations in DNA (genotyping), those that identify a microorganism and those that indicate the presence of the organism and its epidemiological use.
3. Confirm discrepancies between different tests and verify to determine if there is any technical error.
4. Demonstrate skill development in molecular techniques.
5. Correlate the results of the tests used with molecular diagnostics.
6. Analyze the different systems or platforms for the recommendation of these in the determination of laboratory tests, in the molecular field, that are useful to confirm or give continuity to a clinical or forensic diagnosis.

Competencies of the graduate profile addressed in this course:

1. To establish the importance of Microbiology in the genomic era, in aspects related to human health and the balance of ecosystems.

2. Evaluate scientific information from diverse sources.
3. Apply molecular microbiology methodologies in scientific research aimed at problem solving.
4. Argue ideas and results of research, before the scientific community, orally, and in writing, in Spanish and English.

IV. CONTENT

- A. Laboratories
 1. Cell Culture
 - a) Physical methods of cell separation
 - (1) Size and sedimentation rate
 - (2) Cell density
 - (3) Flow Cytometry
 - (4) Other techniques:
 - (a) Panning
 - (b) Biological parameters and others.
 - b) Stem cells: Methods for induction of differentiation.
 2. Determination of viral load by PCR using commercial assay systems.
 - a) Sample preparation for reverse transcription and PCR amplification.
 - b) Reverse transcription
 - c) PCR amplification
 - d) Selective amplification
 - e) Hybridization reaction
 - f) Viral RNA detection and quantification reaction.
 - g) Considerations when performing the test
 - h) Routine safety requirements
 - i) Calibration
 - j) Quality Control and Preventive Maintenance
 3. DNA Fingerprinting (Restriction Fragment Length Polymorphism [RFLP])
 4. PCR-based methods
 - a) Asymmetric PCR
 - b) Nested PCR
 - c) Multiplex PCR
 - d) Competitive PCR
 - e) Real-time PCR
 5. Western Blot
 6. Proteomics (2-Dimension Gel Electrophoresis and Mass Spectrometry)
 7. Genetic Identity
 - a) Paternity
 - b) Identification of forensic samples
 8. Workshops by automated equipment manufacturing companies (Platforms)
- B. Conferences:
 1. presentation, evaluation, and discussion of papers demonstrating the use of the different techniques.
 2. Presentation, evaluation and discussion of the different platforms available in the market for molecular diagnostics.

V. LEARNING ACTIVITIES

1. Power point lectures.
2. Group discussion
3. Readings and evaluation of manuals produced by manufacturing companies.
4. Laboratories
5. Visits and practices to use the instruments available at other campuses, universities and clinical laboratories. universidades y laboratorios clínicos.

VI. EVALUATION

The evaluation of the course will be based on:

	Score	% of Final Grade
1 Final exam	100	25
Article discussion	100	25
Laboratory reports	200	50
Total	400	100

VII. SPECIAL NOTES

A. Auxiliary services or special needs

All students who require auxiliary services or special assistance must request these at the beginning of the course or as soon as they know that they need them, through the proper registry, in the Office of Orientation with Sr. José Rodríguez.

B. Honesty, fraud, and plagiarism

Dishonesty, fraud, plagiarism and any other inappropriate behavior in relation to academic work constitutes major infractions sanctioned by the General Student Regulations. The major infractions, as stated in the General Student Regulations, may have as a consequence, suspension from the University for a definite period greater than one year or the permanent expulsion from the University, among others sanctions.

C. Use of electronic devices

Cellular telephones and any other electronic device that could interrupt the teaching and learning processes or alter the environment leading to academic excellence will be deactivated. Any urgent situation will be dealt with, as appropriate. The handling of electronic devices that allow students to access, store or send data during evaluations or examinations is prohibited.

D. Compliance with the Provisions of Title IX

The Federal Higher Education Act, as amended, prohibits discrimination because of sex in any academic, educational, extracurricular, and athletic activity or in any other

program or function, sponsored or controlled by a higher education institution, whether or not it is conducted within or outside the property of the institution, if the institution receives federal funds.

In harmony with the current federal regulation, in our academic unit an Assistant Coordinator of Title IX has been designated to offer assistance and orientation in relation to any alleged incident constituting discrimination because of sex or gender, sexual harassment or sexual aggression. The Assistant Coordinator, Sr. George Rivera, can be reached by phone at 787-250-1912, extension 2262 o 2147, or by e-mail griverar@metro.inter.edu.

The Normative Document titled Norms and Procedures to Deal with Alleged Violations of the Provisions of Title IX is the document that contains the institutional rules to direct any complaint that appears to be this type of allegation. This document is available in the Web site of Inter American University of Puerto Rico (www.inter.edu).

VIII. EDUCATIONAL RESOURCES

Textbooks

Buckingham Lela. (2011). Molecular Diagnostics: Fundamentals, Methods and Clinical Applications. 2nd Edition.

IX. BIBLIOGRAPHY

Trent, R.J. (2012). Molecular Medicine: Genomics to Personalized Healthcare. Elsevier Science.

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