

**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	:	Biochemistry of biomolecules II
Code and number	:	MOMI 5102
Credits	:	3
Academic term	:	
Instructor	:	
Office hours and location	:	
Office telephone	:	
E-mail	:	

II. DESCRIPCIÓN

Analysis of the biosynthesis and metabolism of carbohydrates, lipids, and proteins. Evaluation of protein purification methods as tools in the development of research. Prerequisite: MOMI 5101.

III. OBJETIVES

Upon completion of the course, the student will be able to:

1. Evaluate scientific articles on biochemical studies with applications in microbiology.
2. Argue ideas and results of recent research on biochemical aspects in microbiological systems.
3. Value the importance of ethical standards related to research in the biochemistry of microorganisms.

Competencies of the graduate profile addressed in the course:

Demonstrate knowledge in:

Evaluating scientific information from diverse sources.

Possess skills to:

Argue ideas and research results, before the scientific community, orally and in writing, in Spanish and English.

Demonstrate an attitude to:

Value the importance of ethical standards related to scientific conduct in research, respect for confidentiality and defense of intellectual property.

IV. CONTENT

- A. Structure and function of biomolecules
 - 1. Structure and function of carbohydrates and lipids
 - 2. Metabolism of carbohydrates and lipids

- B. Protein metabolism
 - 1. The genetic code
 - 2. Protein synthesis (translation)
 - 3. Post-translational processing
 - 4. Regulated and constitutive pathways of protein secretion.
 - 5. Metabolic pathways
 - 6. Protein labeling and degradation

- C. Protein diversity
 - 1. Structural proteins
 - 2. Transport proteins
 - 3. Immunoglobulins and defense proteins
 - 4. Membrane proteins

- D. Signal transduction through membranes
 - 1. Protein-coupled receptors
 - 2. Secondary messengers
 - 3. Transcription factors
 - 4. Apoptosis

- E. Enzyme kinetics
 - 1. Mechanisms of catalysis
 - 2. Competitive and allosteric inhibition

- F. Proteomic analysis

1. Extraction and purification of nucleic acids and proteins.
 - a) Electrophoresis (1D & 2D)
 - b) Chromatography
 - c) ITRAC and SILAC
2. Techniques for Protein Identification
 - a) Amino acid sequencing
 - b) Mass Spectrometry (MS)
 - c) MALDI-TOF
3. Techniques for the study of protein structure and function
 - a) NMR
 - b) Crystallography and X-ray diffraction
 - c) Recombinant proteins and site-directed mutagenesis

V. LEARNING ACTIVITIES

1. Illustrated lectures in power point format
2. Audiovisual presentations of animated videos and virtual methods.
3. Additional readings available online on the Blackboard platform.
4. Study and discussion of research cases applied to immunology.

VI. EVALUATION

Course evaluation consists of:

	Score	% of Final Grade
3 Exams	300	75
Oral presentation	100	25
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

Menninger Principles of Biochemistry. David L. Nelson, Michael M. Cox. W H Freeman & Co.; 6th edition. 2012. ISBN-10: 1-4292-3414-8 / ISBN-13: 978-1-4292-3414-6

IX. BIBLIOGRAPHY

Cell and Molecular Biology: concepts and Experiments 6th Edition, 2010. Gerald Karp. John Wley and Sons, Inc. Hoboken, NJ. ISBN: 13 9780470483374

Molecular Biology of the Cell, 5th Edition, 2009., Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. 2008 Garland Science, Abingdon, OX, UK. ISBN: 9780815341055

Fundamentals of Biochemistry, 2nd Edition, 2006. Donald Voet, Judith G. Voet and Charlotte W. Pratt. 2006. John Wley and Sons, Inc. Hoboken, NJ. ISBN: 0471214957.

Electronic resources

1. National Center for Biotechnoogy Information
<http://www.ncbi.nlm.nih.gov/>
2. FT Map Protein Mapping
<http://ftmap.bu.edu/>
3. Swiss Doc

<http://www.swissdock.ch/>

4. UCSF Chimera

<http://www.cgl.ucsf.edu/chimera/>

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