



UNIVERSITY OF PUERTO RICO  
MEDICAL SCIENCES CAMPUS  
SCHOOL OF MEDICINE  
DEPARTMENT OF BIOCHEMISTRY



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## COURSE SYLLABUS

<b>COURSE TITLE:</b>	Data Analysis in Cancer Research
<b>CODIFICATION:</b>	INTD 5065 / INTD 8065
<b>NUMBER OF CREDITS HOURS:</b>	2 semester credits
<b>CONTACT HOURS:</b>	36
<b>NAME OF COORDINATOR:</b>	Luis R. Pericchi Guerra, PhD
<b>PRE-REQUISITES:</b>	- Calculus I or equivalent - Basic course in statistics or biostatistics
<b>CO-REQUISITES:</b>	N/A

### COURSE DESCRIPTION

Through lectures, group discussions and other active learning strategies, this course will introduce the students to statistical and computing methods for observational studies and clinical trials. The students will acquire knowledge in basic concepts of Data Analysis, utilizing Biostatistics and Bioinformatics tools, and applying these to biomedical/translational cancer and population sciences research.

### TERMINAL OBJECTIVES

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

1. Apply the basic methods of data analysis and the elementary concepts of Biostatistics and Bioinformatics in applications related to Cancer Research.
2. Use powerful and flexible software (such as R and Bio-Conductor software packages) to effectively put into practice data analytic techniques in Cancer Research and be able to develop inferences.
3. Develop case studies utilizing cancer data.

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The Course is registered under UPR School of Medicine, Biochemistry Department  
José Rodríguez-Medina, Coordinator

## COURSE CONTENT AND TIME DISTRIBUTION

Lecture / Topic	Time Allocation
1. Introduction to Biostatistics. General Introduction to R in Biostatistics	2.5
2. How to Generate Descriptive Statistics in R	2.5
3. How to Generate Inferential Statistics in R	2.5
4. Testing Hypothesis	2.5
5. Calculation of Sample Size and Power	2.5
6. Linear Models: Simple Regressions, Hypothesis Testing, and Diagnostics of the Model. Multiple linear regression	2.5
7. One Way Analysis of Variance	2.0
8. Contingency Tables and Log-linear Models	2.5
9. Contingency Tables and Log-linear Models	2.0
10. Introduction to Omics Sciences	2.5
11. Introduction to Bioinformatics and Essentials of BioConductor	2.5
12. Analysis of Omics Datasets	2.5
13. Gene Clustering Analysis	2.5
14. Next Generation Sequencing	2.5
15. Bioinformatics case study	2.0
<b>Total</b>	<b>36 contact hours</b>

## INSTRUCTIONAL TECHNIQUES

- Lectures
- Group Discussions
- Hands-on Experience
- Active Learning Strategies

## REQUIRED COURSE RESOURCES

The course will be offered on-line. You need to have a personal computer.

## EVALUATION TECHNIQUES

Student will be evaluated on a scale from A to C. Grades will be based on:

EVALUATION	PERCENT
Homeworks	20%
Project in Biostatistics	35%
Project in Bioinformatics	35%
Attendance*	10%
<b>Total</b>	<b>100%</b>

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\*Attendance and punctuality are compulsory.

### **Homeworks**

All assignments must be submitted by the students on the dates indicated. Only under extraordinary circumstances will a postponement be allowed upon presentation of an appropriate excuse.

### **Projects**

Student must submit a report of two short projects using R and Bioconductor. These papers should not exceed 10 pages including tables and graphs (but excluding references, which should be included in alphabetical order). The reports should contain the computer code as an appendix which does not count toward the page limit.

### **Attendance**

Attendance at all educational activities specified by the professor **will be mandatory**. Being forced to miss class, the student must submit an appropriate official excuse and meet with the professor to discuss the case.

## **COURSE EVALUATION POLICY**

The evaluation of courses and professors by students is essential for the continued development and enhancement of academic programs. The School of Dental Medicine uses the student evaluations in order to monitor and improve the dental curriculum. The students will have the opportunity of evaluating this course and the professors at the end of the course. The evaluations are completed online and the evaluation link is sent to each student by email.

### **REMEDIAL ACTIONS:**

In cases where a student does not meet the minimum didactic criteria required of the course, the following protocol will be considered for possible remediation actions:

- each case will be evaluated individually
- the student must have demonstrated a satisfactory professional attitude in the course, this includes attendance, to be eligible for consideration
- the final decision will be made by the course coordinator and will consider an appropriate remedial action or reposition designed to correct the deficient didactic, laboratory and/or criteria
- if the coordinator elects to change a grade as part of the successful completion of an in-course remediation process, that grade cannot be higher than a “C”

## **ENUNCIADO DE MODIFICACIÓN RAZONABLE**

Todo estudiante que presente una condición o situación de salud que lo cualifique ante la ley para recibir modificación razonable, tiene el derecho de hacer su solicitud por escrito en la Oficina de Servicios para Estudiantes con Impedimentos (OSEI), siguiendo el procedimiento establecido en el documento Solicitud de Servicios y Modificación Razonable. Copia de este documento se obtiene en la Oficina de OSEI, localizado en el tercer piso del edificio Dr. Guillermo Arbona Irizarry, Oficina B-349 (junto a Servicios

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Médicos a Estudiantes) y en la página cibernética del RCM en el Portal del Decanato de Estudiantes. La solicitud no exime al estudiante de cumplir con los requisitos académicos de los programas de estudio.

CIPE- Enmendado y Actualizado 07-02-2018.

### **REASONABLE MODIFICATION STATEMENT**

Any student who presents a condition or health situation that qualifies him / her before the law to receive reasonable modification, has the right to make his request in writing in the Office of Services for Students with Disabilities (OSEI), following the procedure established in the document Request for Services and Reasonable Modification. A copy of this document is obtained in the OSEI Office, located on the third floor of the Dr. Guillermo Arbona Irizarry building, office B-349 (next to Medical Services for Students) and on the RCM's website in the Deanship of Students portal. The application does not exempt the student from fulfilling the academic requirements of the study programs.

CIPE- Amended and Updated on 02-07-2018.

### **INTEGRIDAD ACADÉMICA**

La Universidad de Puerto Rico promueve los mas altos estándares de integridad académica y científica. El Artículo 6.2 del Reglamento General de Estudiantes de la UPR (Certificación 154 2010-2011 Junta de Síndicos) en la sección 6.2.1 define **Deshonestidad Académica** como: *"Toda forma de deshonestidad o falta de integridad académica, incluyendo, pero sin limitarse a, acciones fraudulentas, la obtención de notas o grados académicos valiéndose de falsas o fraudulentas simulaciones, copiar total o parcialmente la labor académica de otra persona, plagiar total a parcialmente el trabajo de otra persona, copiar total o parcialmente las respuestas de otra persona a las preguntas de un examen, haciendo o consiguiendo que otro tome en su nombre cualquier prueba o examen oral o escrito, así como la ayuda o facilitación para que otra persona incurra en la referida conducta"*. En la sección 6.2.2. define **Conducta Fraudulenta** como: *"La conducta con intención de defraudar, incluyendo, pero sin limitarse a, la alteración maliciosa o falsificación de calificaciones, expedientes, tarjetas de identificación u otros documentos oficiales de la Universidad o de cualquier otra institución. Estará igualmente, sujeto a sanción disciplinaria todo acto de pasar o circular como genuino y verdadero cualquiera de los documentos antes especificados sabiendo que las mismas son falsas o alterados"*.

Cualquiera de estas acciones estará sujeta a sanciones disciplinarias en conformidad al procedimiento establecido en el Reglamento General de Estudiantes vigente.

Aprobado par el Senado Académico, Certificación 049, 2016-2017.

### **ACADEMIC INTEGRITY**

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the University of Puerto Rico General Student Regulations (Board of Trustees Certification 154 2010-2011) in section 6.2.1 defines **Academic Dishonesty** as: "Any form of dishonesty or lack of academic integrity, including, but not limited to, fraudulent actions, obtaining grades or degrees using false or fraudulent simulations, copying in whole or in part the academic work of another person, plagiarizing in whole or in part the

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work of another person, to copy in whole or in part the answers to the questions of an examination from another person, making or getting another person to take any oral or written test or examination on their behalf, as well as help or facilitate that another person incurs in said behavior". Section 6.2.2. defines **Fraudulent Conduct** as: "Conduct with intent to defraud, including, but not limited to, malicious alteration or falsification of grades, records, identification cards or other official documents of the University or any other institution. Any act or action of passing or circulating as genuine and true any of the documents specified above will also be subject to disciplinary sanction, knowing that they are false or altered". Any of these actions will be subject to disciplinary sanctions in accordance with the procedure established in the current University of Puerto Rico General Student Regulations. **DISCLAIMER:** The above statement is an English Translation of certain parts Article 6.2 of the General Student Regulations of the University of Puerto Rico (Reglamento General de Estudiantes de la Universidad de Puerto Rico- Cert. JS 154 2010-2011). It was originally prepared by the Deanship of Academic Affairs of the Medical Sciences Campus, and revised and approved by the Academic Senate on March 2, 2017. In case of a discrepancy or disagreement with the original text in Spanish, the Spanish version will always prevail and be given priority.

Approved by the Academic Senate, Certification 049,2016-2017.

#### **TÍTULO IX: NO DISCRIMINACIÓN**

El Recinto de Ciencias Médicas (RCM) de la Universidad de Puerto Rico (UPR), no discrimina en sus ofrecimientos académicos por razón de sexo, raza, color, edad, origen nacional, por ideas políticas o religiosas, género, expresión o identidad de género, embarazo, estado civil, orientación sexual, origen étnico o por ser víctima o ser percibida como víctima de violencia doméstica, agresión sexual, hostigamiento sexual o acecho. Esta política cumple con los estatutos federales bajo Título IX, según enmendada, y las políticas institucionales relacionada a la UPR. Es deber de todo miembro de la comunidad universitaria notificar cualquier evento de discriminación o queja ante la Oficina de la Coordinadora de Título IX, teléfono 787-758-2525, ext. 1368 o 1360, o accediendo a la página cibernética [www.rcm.upr.edu/tituloix](http://www.rcm.upr.edu/tituloix).

Aprobado por el Senado Académico, Certificación 035, 2018-2019, Enmendada.

#### **TITLE IX: NO DISCRIMINATION**

The Medical Sciences Campus (MSC) of the University of Puerto Rico (UPR) does not discriminate in its academic offerings because of sex, race, color, age, national origin, political or religious ideas, gender, gender identity or expression, pregnancy, civil status, sexual orientation, ethnic origin or because of being a victim or be perceived as a victim of domestic violence, sexual assault, sexual harassment or stalking. This policy complies with federal statutes under Title IX, as amended, and related the institutional policies of the UPR. It is the duty of every member of the university community to notify any discrimination or complaint event before the Office of the Title IX Coordinator, telephone 787-758-2525, ext. 1368 or 1360, or accessing the web page [www.rcm.upr.edu/tituloix](http://www.rcm.upr.edu/tituloix).

Approved by the Academic Senate, Certification 035, 2018-2019, Amended.

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## POLÍTICA EN CONTRA DEL ACOSO SEXUAL

«La Universidad de Puerto Rico prohíbe el discrimen por razón de sexo y género en todas sus modalidades, incluyendo el hostigamiento sexual. Según la Política Institucional contra Hostigamiento Sexual, Certificación 130 (2014-15) de la Junta de Gobierno, si un estudiante es o está siendo afectado por conductas relacionadas a hostigamiento sexual, puede acudir a la Oficina de la Procuraduría Estudiantil, el Decanato de Estudiantes o la Coordinadora de Cumplimiento con Título IX para orientación o para presentar una queja».

## POLICY AGAINST SEXUAL HARASSMENT

«The University of Puerto Rico prohibits discrimination based on sex, sexual orientation, and gender identity in any of its forms, including that of sexual harassment. According to the Institutional Policy Against Sexual Harassment at the University of Puerto Rico, Certification 130 (2014-2015) from the Board of Governors, any student subjected to acts constituting sexual harassment, may turn to the Office of the Student Ombudsperson, the Office of the Dean of Students, or the Coordinator of the Office of Compliance with Title IX for an orientation or formal complaint».

## PLAN DE CONTINGENCIA PARA UN EVENTO DE EMERGENCIA O INTERRUPCIÓN DE CLASES

“En caso de haber una interrupción en las labores académicas como consecuencia de una emergencia el profesor utilizará un mecanismo alternativo para comunicarse con el estudiante y continuar, de ser posible, con el ofrecimiento del curso utilizando recursos de tecnologías alternos.”

## CONTINGENCY PLAN IN THE EVENT OF AN EMERGENCY OR CLASS INTERRUPTION

"In the event of an interruption in academic work as a consequence of an emergency, the professor will use an alternate mechanism to communicate with the student and con

## GRADING SYSTEM

The grading system for this course is as follows:

90 - 100	A
80 - 89	B
70 - 79	C
Less than 70	F

## BIBLIOGRAPHY

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