University of Puerto Rico
Medical Sciences Campus
Department of Physiology
School of Medicine
Second Semester
Academic Year 2012-2013

Course Syllabus

COURSE TITLE: **VERTEBRATE PHYSIOLOGY II**

CODIFICATION: **FISA 8602**

CONTACT HOURS: **4 CREDITS (72 H)**

DURATION **: 18 WEEKS**

NUMBER OF STUDENTS ACCEPTED: **MINUMUM 3, MAXIMUN 15**

NAME OF COORDINATOR: **MARIA J. CRESPO, PH.D. (maria.crespo3@upr.edu)**

COORDINATOR'S OFFICE: **A-667**

COORDINATOR'S OFFICE PHONE: (**787) 758-2525 EXT 5078**

MEETING PLACE: **A-657 (MEETING ROOM, DEPARTMENT OF PHYSIOLOGY)**

HORARIO DEL CURSO: **TO BE DETERMINED**

PERIOD : **SECOND SEMESTER**

PRE-REQUISITES: **FISA 8601**

DESCRIPTION: This course is designed to provide graduate students with basic knowledge in the area of vertebrate physiology. This course, which is a continuation of Vertebrate Physiology I, provides graduate students in physiology and other basic sciences with a fundamental knowledge of the physiology of the principal human organs and systems. This course is required for all master and doctoral students in the Physiology Department, and for all doctoral students in Anatomy and Pharmacology. Students from the Intercampus Doctoral Program of the Biology Department of the University of Puerto Rico, Rio Piedras Campus are also allowed to register in this course.

The course will consist of the following 5 sections: Cardiovascular Physiology, Respiratory Physiology, Renal Physiology, Gastrointestinal Physiology, and Special Topics in Physiology. The ultimate goal of the course is to enable students to further understand the basic physiological processes of vertebrates, in particular, humans.

COURSE OBJECTIVES:

At the end of this course, students should have an understanding of the following aspects of each system:

I. Muscle Physiology

1. The morphological and functional characteristics of skeletal muscle.
2. The morphological and functional characteristics of cardiac muscle.
3. The morphological and functional characteristics of smooth muscle.

II. Cardiovascular Physiology

1. The regulatory principles involved in muscular development and adaptation.
2. The role of the heart as a pump.
3. The Cardiac Cycle
4. The circulatory system.
5. The regulation and function the different parts of the circulatory system.
6. Coupling of the Heart and Blood Vessels

III. Respiratory Physiology

1. The laws of gases.
2. The mechanisms involved in gas transport.
3. Pulmonary Mechanics and Alveolar Ventilation
4. The ventilation and perfusion processes.
5. Regulation of Breathing

IV. Renal Physiology

1. Fundamentals of renal function.
2. Glomerular filtration rate
3. Tubular Transport Mechanisms
4. Sodium and Water Balance
5. Concentration and Dilution of Urine
6. Acid-base balance and potassium balance

V. Gastointestinal Physiology

1. The general structure and function of the gastrointestinal system.
2. The processes of chewing and swallowing.
3. The processes of motility and gastric secretion.
4. Pancreatic and biliary secretions.
5. The processes of intestinal motility, secretion, and absorption.

VI. Special Topics

1. Physiological responses and adaptations to Outer Space.
2. Physiological responses and adaptations to high altitude.
3. Physiological responses and adaptations to exercise.
4. Thermoregulation

TEACHING STRATEGIES:

The course is taught through a combination of lectures, paper presentations, and supervised independent study. These strategies will be supplemented with assigned readings, and instructional computer software. The students will also present paper on a topic selected in consultation with the course coordinator.

LEARNING RESOURCES:

1. Teaching Faculty of the Physiology Department
2. Access to laboratories and facilities of the Physiology Department
3. Course Syllabus, slide presentations, and Laboratory Manual

MANDATORY REQUISITES: Attendance and punctuality

COURSE EVALUATION

Students will be evaluated as follows:

• Four Quizzes at 5 % each:		20 %
• First Partial Exam 1:	Topics: I to III	30%
• Second Partial Exam 1:	Topics IV to VI	30%
• One oral Presentation of an article selected from the literature:*		15%
• Attendance and class participation		5%
		100%

* The oral presentation will be on a scientific article assigned by a professor (selected at random)

GRADING SYSTEM:

A quantifiable grading system will be used, assigning a letter grade (A-F) at the end of the course. Letter grades will be determined using the following breakdown of numeric scores:

A: 90 – 100%
B: 80 – 89%
C: 70 – 79%
F: 0 – 69%

Final grades of 70% or above will be considered passing grades.

THE FACULTY OF THE COURSE RESERVES THE RIGHT TO MAKE CHANGES IN THE GRADING SYSTEM, IN THE CASE OF UNANTICIPATED EVENTS.

AN ABSENCE TO ANY EXAM MUST BE ACCOMPANIED WITH AN APPROPRIATE JUSTIFICATION. UPON THE REVIEW OF THE JUSTIFICATION BY THE COURSE COORDINATOR AND ACCEPTANCE OF THE JUSTIFICATION BY THE DEPARTMENT, THE STUDENT MAY BE ALLOWED TO TAKE A MAKEUP EXAM AT A DATE ARRANGED WITH THE COORDINATOR.

BIBLIOGRAFY:

Reference Books:

Required:
Physiology; R.M. Berne and M.N. Levy. Fifth Edition. Mosby, Inc. N.Y. 2004
Respiratory Physiology-The Essentials, J.B. West. Ninth Edition, 2012

Recommended:
Medical Physiology (2nd edition, by Rhoades and Tanner, 2003)
Human Physiology (8th edition, by Vander, Sherman and Luciano, 2001)
Medical Physiology (2st edition, by Boron, and Boulpaep, 2009)

Note: Additional Textbooks could be required or suggested by each facultative.

Websites:

1. American Physiological Association website
   http://www.the-aps.org/
2. Pubmed
   http://www.ncbi.nlm.nih.gov/sites/entrez?myncbishare=bibrcm&holding=uprmslib

ACOMODO RAZONABLE

Todo estudiante que presente una condición o situación de salud que lo cualifique ante la ley para recibir acomodo razonable, tiene el derecho de hacer su solicitud por escrito al profesor y al Decano de la Facultad, siguiendo el procedimiento establecido en el documento **Proceso de Tramitación de Acomodo Razonable del Recinto de Ciencias Médicas**. Copia de este documento se obtiene libre de costo en el Decanato de Estudiantes localizado en el segundo piso del edificio de Farmacia, cuyo número de

teléfono es el 758-2525 extensión 5203, en cada facultad, y en la página cibernética del RCM. La solicitud no exime al estudiante de cumplir con los requisitos académicos de los programas de estudio en el Recinto de Ciencias Médicas.

REASONABLE ACCOMMODATION

Students with a health condition or situation that, according to the law, makes them eligible for reasonable accommodation have the right to submit a written application to the professor and the Dean of their Faculty, according to the procedure established in the document **Submittal Process for Reasonable Accommodation of the Medical Sciences Campus**. A free copy of this document may be obtained at the Office of the Dean for student Affairs, second floor of the School of Pharmacy building; phone 787-758-2525 ext. 5203. A copy may also be obtained at the Office of the Dean of each faculty, as well as in the MSC web page. The application does not exempt students from complying with the academic requirements pertaining to the programs of the Medical Sciences Campus.

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STATEMENT ON ETHICS:

The written examinations are the means utilized by the Department to measure the student's performance in their educational experiences. It is our intention to guarantee that all students have the opportunity to demonstrate their academic achievements under the same circumstances, eliminating all possibility for unfair or unethical behavior. To attain this goal, we trust in our students' commitment to honesty and professional ethics. Should unethical behavior be observed, appropriate measures will be taken.

Should knowledge become available that dishonesty regarding any particular examination has occurred; the faculty of the course reserves the right to cancel the examination before or after it has been administered and to require a repeat exam or to completely disregard the exam from the course evaluation.

Participating Faculty:

Dr. M.J. Crespo, Lab. A667, Ext. 8078	maria.crespo3@upr.edu
Dr. N. Escobales Lab. A-663 Ext 1612	nelson.escobales@upr.edu
Dr. C. Jimenez, Lab. A-689 Ext. 1613	carlos.jimenez8@upr.edu
Dr. G.E. Santacana, Lab. A-644 Ext. 1644	guido.santacana1@upr.edu
Dr. W. Silva, Lab. A-688 Ext.1611	walter.silva@upr.edu

Office Hours

All professors will be available for consultation during the week by prior appointment

DEPARTMENT OF PHYSIOLOGY
GRADUATE PHYSIOLOGY (FISA 8602)
COURSE SCHEDULE
JANUARY-MAY 2012

Time: Tuesdays and Thursdays (9:00-11:00 AM)

Room: A-656

Course Coordinator: Dr. Maria J. Crespo (maria.crespo3@upr.edu) (X5078)

January 15 (Tuesday)	Introduction (Dr. Maria J. Crespo)

Muscle and Cardiovascular Physiology (Dr. Guido Santacana)

January 17 (Thursday)	Skeletal Muscle Mechanics
January 22 (Tuesday)	Skeletal Muscle
January 24 (Thursday)	Heart Electrophysiology
January 29 (Tuesday)	Heart Mechanics / The Cardiac Cycle
January 31 (Thursday)	The Arterial System
February 5 (Tuesday)	Cardiac Regulation
February 7 (Thursday)	Coupling of the Heart and Blood Vessels
Quiz #1	(Date and hour by appointment with Dr. Guido Santacana)

Respiratory Physiology (Dr. Maria J. Crespo)

February 12 (Tuesday)	Composition of the Air/ Laws of Gases
February 14 (Thursday)	Pulmonary Mechanics
February 19(Tuesday)	Alveolar Ventilation
February 21 (Thursday)	Oxygen and CO_2 Transport in Blood
February 26 (Tuesday)	Ventilation/Perfusion and Shunts
February 28 (Thursday)	Regulation of Breathing
Quiz #2	(Date and hour by appointment with Dr. Maria J. Crespo)

March 5 (Tuesday)	Study Day for Exam I
March 7 (Thursday)	EXAM I (Muscle, Cardiovascular and Respiratory Physiology)

Renal Physiology (Dr. Nelson Escobales)

March 12 (Tuesday)	The Nephron / Clearance
March 14 (Thursday)	RCM FORUM
March 19 (Tuesday)	Tubular Transport Mechanisms and Hemodynamic
March 21 (Thursday)	Sodium and Water Balance
March 26 (Tuesday)	Concentration and Dilution of Urine
March 28	HOLIDAY
April 2 (Tuesday)	Acid-base balance and Potassium Balance
April 4 (Thursday)	Diuretics
Quiz #3	(Date and hour by appointment with Dr. Nelson Escobales)

Gastrointestinal Physiology (Dr. Walter Silva)

April 9 (Tuesday)	Chewing, Salivary Secretion, Swallowing and Vomiting
April 11 (Thursday)	Gastric Secretion and Motility
April 16 (Tuesday)	Absorption of Water and Electrolytes
April 18 (Thursday)	Digestion and Absorption of Carbohydrates
April 23 (Tuesday)	Digestion and Absorption of Proteins and Fats

Quiz #4 (Date and hour by appointment with Dr. Walter Silva)

April 25 (Thursday)	Special Topic 1: Space Physiology (Dr.Santacana)
April 30 (Tuesday)	Special Topic 2: Thermoregulation (Dr. C.Jiménez)
May 2 (Thursday)	Special Topic 3: Exercise Physiology (Dr. Rivera-Brown)
May 7 (Tuesday)	Study Day
May 9 (Thursday)	EXAM II (Renal, GI, and Special Topics)
May 21 (Tuesday)	**Oral Presentations** (1/2 Students)
May 23 (Thursday)	**Oral Presentations** (1/2 Students)