

## Guía docente / *Course Syllabus*

2018-19

### 1. Descripción de la Asignatura / *Course Description*

Asignatura <i>Course</i>	FISIOLOGÍA ANIMAL (docencia en inglés)
Códigos <i>Code</i>	202105
Facultad <i>Faculty</i>	Facultad de Ciencias Experimentales
Grados donde se imparte <i>Degrees it is part of</i>	Grado en Biotecnología
Módulo al que pertenece <i>Module it belongs to</i>	Fundamentos de biología, microbiología y genética
Materia a la que pertenece <i>Subject it belongs to</i>	Fisiología animal
Departamento responsable <i>Department</i>	Fisiología, Anatomía y Biología Celular
Curso <i>Year</i>	3º
Semestre <i>Tern</i>	1º
Créditos totales <i>total credits</i>	6
Carácter <i>Type of course</i>	Básica
Idioma de impartición <i>Course language</i>	Inglés
Modelo de docencia <i>Teaching model</i>	A2

Clases presenciales del modelo de docencia A2 para cada estudiante: 31 horas de enseñanzas básicas (EB), 7 horas de enseñanzas prácticas y de desarrollo (EPD) y 7 horas de actividades dirigidas (AD). Hasta un 10% de la enseñanza presencial puede sustituirse por docencia a distancia (también presencial, pero posiblemente asincrónica), de acuerdo con la programación de la Asignatura publicada antes del comienzo del curso.

*Number of classroom teaching hours of A2 teaching model for each student: 31 hours of general teaching (background), 7 hours of theory-into-practice (practical group tutoring and skill development) and 7 hours of guided academic activities. Up to 10% of face-to-face sessions can be substituted by online teaching, in accordance with the course schedule published before it begins.*

## 2. Responsable de la Asignatura / *Course Coordinator*

## 3. Ubicación en el plan formativo / *Academic Context*

<p>Breve descripción de la asignatura <i>Course description</i></p>	<p>“All organisms are professional problem solvers: before life, problems did not exist. Problems and life entered the world together, and with them problem solving”.</p> <p>Sir Karl Raimund Popper (Austrian and British philosopher)</p> <p>This course is an introduction to concepts and basic issues in Animal Physiology, Students will master the basic principles of physiology and use these to understand and interpret the operation of the physiological systems, as well as the structural design that allows this operation.</p> <p>The emphasis will be on comparative physiology but there will be some coverage of other physiology approaching. The laboratory component of the course is designed to reinforce some of the topics discussed in lecture, as well as to familiarize students with some of the laboratory techniques and equipment used in the acquisition of physiological data.</p>
<p>Objetivos (en términos de resultados del aprendizaje) <i>Learning objectives</i></p>	<ul style="list-style-type: none"><li>• Meet the nomenclature and the basics in animal physiology and processes that allow the operation of physiological systems, particularly, their regulation and interaction.</li><li>• Understands and can efficiently handle texts and manuals of Animal Physiology.</li><li>• Able to develop experiments animal physiology laboratory under supervision.</li><li>• Can solve problems based on the diversity of the physiological processes of different animal groups.</li></ul>
<p>Prerrequisitos <i>Prerequisites</i></p>	<p>3.3. Recommended or required prior knowledge</p> <ul style="list-style-type: none"><li>• General knowledge of biology.</li><li>• Understanding and familiarity of the essential concepts of physics and chemistry</li></ul>
<p>Recomendaciones <i>Recommendations</i></p>	<ul style="list-style-type: none"><li>• Good English (spoken and written)</li><li>• Managing the WebCT platform is of great interest to follow the course.</li></ul> <p>Animal Physiology is an exciting discipline that always captivates the attention of students. As it is a subject of greater teaching content in the semester, it is particularly important that the planning of its preparation is reasonably adequate to be able to enjoy it, obtaining the best academic results.</p> <p>Please, remember that it is very important to read and understand the syllabus. It is the best source of information about the subject and it contains all the information you need to follow the course over the term.</p>
<p>Aportaciones al plan formativo <i>Contributions to the educational plan</i></p>	<p>3.2. Contributions to the training plan</p> <p>Among the main contributions of the subject "Animal Physiology" to the Graduate Training Plan in Biotechnology, knowledge and understanding of the physiological mechanisms underlying animal life, has to be noted. The subject uses a comparative and multidisciplinary approach and devotes special attention to the</p>

	<p>regulatory mechanisms.</p> <ul style="list-style-type: none"> <li>• Throughout the course, students become familiar with the basic terminology in Physiology.</li> <li>• Students will acquire the right knowledge about the basic principles of the discipline.</li> <li>• The course should provide students an integrated view of the functioning of biological systems animals.</li> <li>• Upon completion of the course students must know the functions of the organs and systems and their control, and have a clear idea about the physiological mechanisms developed by different groups of animals to survive in their habitat.</li> <li>• While exploring the content mentioned, students will strengthen several transferable skills and they should be able to apply the fundamental concepts of physics and chemistry in their understanding of physiological phenomena.</li> <li>• Students will improve their ability to verbally articulate themselves to a group during guided academic activities.</li> </ul>
--	---

#### 4. Competencias / Skills

<p>Competencias básicas de la Titulación que se desarrollan en la Asignatura <i>Basic skills of the Degree that are developed in this Course</i></p>	<p>CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio</p> <p>CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio</p> <p>CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética</p> <p>CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado</p> <p>CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía</p>
<p>Competencias generales de la Titulación que se desarrollan en la Asignatura <i>General skills of the Degree that are developed in this Course</i></p>	<p>CG1 - Conocer y comprender los procesos biológicos generales desde un punto de vista molecular, celular, fisiológico y, en su caso, de comunidades, de los seres vivos.</p> <p>CG3 - Utilizar con rigor la terminología, nomenclatura y sistemas de clasificación en cada una de las materias impartidas.</p> <p>CG4 - Comprender el método científico. Conocer, entender y aplicar las herramientas, técnicas y protocolos de experimentación en el laboratorio y adquirir las capacidades de observación e interpretación de los resultados obtenidos.</p> <p>CG5 - Adquirir las habilidades adecuadas a cada una de las materias impartidas, mediante la descripción, cuantificación, análisis y evaluación crítica de los resultados experimentales obtenidos de forma autónoma.</p> <p>CG6 - Trabajar de forma adecuada en un laboratorio biológico, químico o bioquímico, conociendo y aplicando las normativas y</p>

	<p>técnicas relacionadas con seguridad e higiene, manipulación de animales de laboratorio y gestión de residuos.</p> <p>CG9 - Desarrollar los métodos de adquisición, interpretación y análisis de la información biológica junto con una comprensión crítica de los contextos apropiados para sus uso, mediante el estudio de manuales, monografías, ensayos, artículos originales, etc.</p> <p>CG10 - Utilizar la literatura científica y técnica de vanguardia, adquiriendo la capacidad de percibir claramente los avances actuales y los posibles desarrollos futuros</p> <p>CG11 - Conocer las metodologías y tecnologías apropiadas para la correcta exposición y comunicación de los diferentes aspectos que afectan a la biotecnología (análisis de datos, bioestadística, etc.).</p> <p>CG12 - Ser consciente de la importancia del trabajo en equipo y potenciación de la discusión crítica de objetivos comunes.</p> <p>CG14 - Ser capaz de implicarse en el desarrollo actual de la biotecnología y sus aplicaciones, así como de los aspectos filosóficos y éticos implicados.</p> <p>CG15 - Ser capaz de comunicar los aspectos fundamentales de la biotecnología tanto a otros profesionales de su tarea de trabajo o de área afines, como a un público no especializado, así como emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética.</p> <p>CG16 - Ser capaz de concienciar a otros sobre la importancia de las aportaciones de la biotecnología a los debates y controversias que su desarrollo genera y como este conocimiento y su comprensión mejora la generación de una opinión informada sobre la calidad y sostenibilidad de los recursos.</p> <p>CG17 - Ser capaz de organizar y planificar un trabajo de investigación de forma que se optimicen los recursos.</p> <p>CG18 - Asimilar conocimientos relevantes de procedencia multidisciplinar, así como emitir reflexiones y juicios basados en la integración de dichos conocimientos.</p> <p>CG19 - Ser capaz de demostrar capacidad de iniciativa responsable en el ámbito de trabajo.</p> <p>CG20 - Desarrollar hábitos de estudio y capacidad de reflexión y crítica para que los ideales profesionales y sus comportamientos se muevan buscando la excelencia profesional.</p> <p>CG22 - Desarrollar las habilidades de aprendizaje necesarias que le permitan emprender, con un elevado nivel de autonomía, estudios posteriores.</p> <p>CG23 - Saber analizar, sintetizar y utilizar el razonamiento crítico en ciencia.</p> <p>CG25 - Desarrollar la capacidad creativa que incentive el dinamismo y la capacidad emprendedora e innovadora así como la identificación de las analogías entre situaciones que permita la aplicación de soluciones conocidas a nuevos problemas.</p>
<p>Competencias transversales de la Titulación que se desarrollan en la Asignatura</p> <p><i>Transversal skills of the Degree that are developed in this Course</i></p>	
<p>Competencias específicas de la Titulación que se desarrollan en la Asignatura</p> <p><i>Specific competences of the</i></p>	<p>CE14 - Conocer y comprender los mecanismos fisiológicos que subyacen a la vida animal y entender las diferencias fisiológicas fundamentales entre los diferentes grupos animales.</p> <p>CE15 - Comprender los principios y mecanismos de regulación en</p>

<i>Degree that are developed in the Course</i>	fisiología animal, así como la relación entre estructura y función en Fisiología. CE52 - Ser capaz de integrar y explicar los conceptos adquiridos durante el estudio de la Fisiología, en particular, las interacciones entre los diferentes sistemas y los mecanismos de retroalimentación
Competencias particulares de la asignatura, no incluidas en la memoria del título <i>Specific skills of the Course, not included in the Degree's skills</i>	4.3. Specific skills of the subject <ul style="list-style-type: none"> <li>• CP1 - Know and understand the physiological mechanisms that underlie animal life and understand the fundamental physiological differences between the different animal groups.</li> <li>• CP2 - Understand the principles and mechanisms of regulation in animal physiology, and the relationship between structure and function in physiology.</li> <li>• CP3 - Be able to integrate and explain the concepts acquired during the study of physiology, in particular the interactions between the different systems and feedback mechanisms.</li> </ul>

### 5. Contenidos de la Asignatura: temario / *Course Content: Topics*

<b>PARTE I</b>	<b>I. INTRODUCTION. PRINCIPLES OF PHYSIOLOGY</b>
TEMA 1	TOPIC 1. INTRODUCTION TO ANIMAL PHYSIOLOGY.
TEMA 2	TOPIC 2. CENTRAL PRINCIPLE OF PHYSIOLOGY. CONCEPT MEDIUM
<b>PARTE II</b>	<b>II. NEURONAL FUNCTION</b>
TEMA 3	TOPIC 3. GENERAL ORGANIZATION OF THE NERVOUS SYSTEM
TEMA 4	TOPIC 4. GENERAL PHYSIOLOGY OF EXCITABLE CELLS
<b>PARTE III</b>	<b>III. SENSORY RECEPTION</b>
TEMA 5	TOPIC 5. SENSORY MECHANISMS. GENERAL PHYSIOLOGY OF SENSORY RECEPTORS
TEMA 6	TOPIC 6. VISION
TEMA 7	TOPIC 7. MECHANORECEPTION.
TEMA 8	TOPIC 8. HEARING.
TEMA 9	TOPIC 9. CHEMORECEPTION. THERMORECEPTION. NOCICEPTION.
<b>PARTE IV</b>	<b>IV. EFFECTOR SYSTEMS</b>
TEMA 10	TOPIC 10. CONCEPT AND TYPES OF EFFECTORS. MUSCULAR FIBRE STRUCTURE
TEMA 11	TOPIC 11. EXCITATION-CONTRACTION COUPLING
<b>PARTE V</b>	<b>V. ENDOCRINE SYSTEMS</b>
TEMA 12	TOPIC 12. INTRODUCTION TO THE STUDY OF ENDOCRINE SYSTEMS
TEMA 13	TOPIC 13. THE HYPOTHALAMIC-PITUITARY AXIS.
TEMA 14	TOPIC 14. PINEAL GLAND. INTERMEDIATE PITUITARY.
TEMA 15	TOPIC 15. THE THYROID AND THYROID HORMONES. PARATHYROID HORMONE.
TEMA 16	TOPIC 16. ADRENAL GLANDS
TEMA 17	TOPIC 17. ENDOCRINE PANCREAS
TEMA 18	TOPIC 18. SEX AND PLACENTAL HORMONES
<b>PARTE VI</b>	<b>VI. CIRCULATORY SYSTEMS AND GAS EXCHANGE.</b>
TEMA 19	TOPIC 19. OVERVIEW CIRCULATORY SYSTEMS.
TEMA 20	TOPIC 20. GAS TRANSFERS IN ANIMALS.
<b>PARTE VII</b>	<b>VII. ION BALANCE AND OSMOTIC. EXCRETORY SYSTEM</b>

TEMA 21	TOPIC 21. FLUID COMPARTMENTS OF ORGANISMS. OSMOREGULATION.
TEMA 22	TOPIC 22. URINE FORMATION
<b>PARTE VIII</b>	<b>VIII. NUTRITION AND DIGESTION</b>
TEMA 23	TOPIC 23. NUTRITION AND DIGESTION.
TEMA 24	TOPIC 24. THE DIGESTIVE SYSTEM

## 6. Metodología y recursos / *Methodology and Resources*

Metodología general <i>Methodology</i>	<p>The course described in this guide, "Animal Physiology" (6 credits, 150 hours), follows a course type A2</p> <p>The tandem "student-professor" through the "coincident work" (EB + EPD + AD) represent the 30% of the total time scheduled for this subject. This 30% (45 hours) is distributed as follows: Basic Teachings (70%), Teaching and Development Practices (15%) and Guided Activities (15%).</p> <p>It is expected that the 60% (90 hours) of the time dedicated to an A2 subject is student autonomous work. The last 10% (15 hours) is dedicated to evaluation tasks.</p>
Enseñanzas básicas (EB) <i>General teaching</i>	<p>The course includes 31 hours of "EB" classes (on site) where we will develop the basics of the subject</p> <p>For the development of the basic teachings assigned classrooms will be used, with up to 60 people and equipped with computer for video projection, allowing presentations with images and animations for the presentation of concepts. In addition, all classrooms have slate for the detailed explanation of those concepts requiring additional explanations or detail.</p>
Enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice</i>	<p>Throughout the course, part of theoretical knowledge will be developed in 5 ("EPD") lab sessions</p> <p>Hands-on lab sessions are conducted primarily in the student's laboratory of Physiology, equipped with the necessary instrumental to perform different practices. Laboratories also have audio visual, simulation tools and consumables necessary for practice. When necessary the sessions will take place in a computer room for the complete development of practices that require it.</p>
Actividades académicas dirigidas (AD) <i>Guided academic activities</i>	<p>The Guided Activities will take place in small groups</p> <p>For the "AD" sessions (4) lab groups splits into two. Students will have the opportunity to discuss videos related to the subject, scientific articles and their own approaches on issues of interest within the scope of the program.</p>

## 7. Criterios generales de evaluación / *Assessment*

Primera convocatoria ordinaria (convocatoria de curso) <i>First session</i>	<p>El 65% de la calificación procede de la evaluación continua. El 35% de la calificación procede del examen o prueba final.</p> <p>Continuous assessment</p> <p>Since the attendance and participation are very important for the qualifications of this subject, the possibility of knowing who is who from the beginning is necessary for the normal development of the course.</p> <p>For that reason and in order to make possible the continuous assessment, the students are kindly requested to provide an ID-photo at the beginning of the semester. You can post your picture</p>
--	---

	<p>directly through the virtual classroom or, if you prefer, you can send it to your professor by any other means.</p> <p>You have to understand that without this tool it would not be possible to take into consideration your public contributions to the course.</p> <p>Evaluation</p> <p>The evaluation will be based on the levels shown in five different sections:</p> <ul style="list-style-type: none"> <li>• Lab sessions (20%). Is scored separately attendance and participation (5%) and a written report of the work done (15%)</li> <li>• Guided activities (10 %). Attendance and participation.</li> <li>• Literature review (20%). Presentation of a topic related to the course chosen by the student.</li> <li>• Summaries of specific topics of the basic teachings (10%).</li> <li>• Active participation (5%). Involvement will be assessed based on the initiative and involvement of each student in different tasks proposed for both classroom and non-classroom performance.</li> <li>• Performing tests (35%).</li> </ul> <p>The exam, to be held at the end of the semester (“first evaluation”) consists of two parts (50 multiple choice questions, 15%) and 4 essay questions (20%). As mentioned above, this exam is mandatory and it is needed to get a minimum mark of “5/10” to pass the course.</p> <p>For the completion of any activity (including exams), the use of paper dictionary is allowed. The exam duration is 3 hours and necessary instructions and recommendations are given in situ. As a general rule, for the elaboration of any kind of reports, and particularly for the exams, it is very advisable the use of diagrams and schemes that improve the understanding of the topic.</p>
<p>Segunda convocatoria ordinaria (convocatoria de recuperación) <i>Second session (to re-sit the exam)</i></p>	<p>Those students who do not pass the first exam (the only mandatory exercise for this subject), can (in order to pass the course) perform a second test (“retake or second-chance exam”), to be held in June or July. The student has the option to retain all the other grades acquired during the continuous assessment.</p> <p>This second-chance examination exam maintains the same structure than the first one (two parts: 50 multiple choice questions and 4 essay questions). Again you need to obtain a grade of “5/10” to pass the course. For the calculation of the final mark the percentages of the different tasks do not change.</p>
<p>Convocatoria extraordinaria de noviembre <i>Extraordinary November session</i></p>	<p>Se activa a petición del alumno siempre y cuando éste esté matriculado en todas las asignaturas que le resten para finalizar sus estudios de grado, tal y como establece la Normativa de Progreso y Permanencia de la Universidad.</p> <p>Se evaluará del total de los conocimientos y competencias que figuren en la guía docente del curso anterior, mediante el sistema de prueba única.</p> <p>See secibd-chance exam.</p>
<p>Criterios de evaluación de las enseñanzas básicas (EB) <i>General teaching assessment criteria</i></p>	<p>Durante la evaluación continua: The student must participate actively in the face-to-face sessions and must be able to express their doubts and their statements in clear and concise language.</p> <p>The exercises presented must be clear and structured.</p> <p>The content of the submitted works must be of the appropriate quality.</p> <p>The exhibition of the works and reports must show an adequate understanding of the topics covered.</p>

	<p>Durante el examen o prueba final (1ª convocatoria): The exam consists of two parts: test questions and short questions. Each question is assessed independently.</p> <p>For the test type, each correct question is scored with 0.1 point (5 points in total if all the exam questions are answered correctly).</p> <p>For short questions (4 questions of 1.25 points each) the content of the answers and their language should be strictly adjusted to the question asked. In general, the use of concise and academically correct language, as well as the use of diagrams and figures, will be positively valued.</p> <p>The final grade of the exam will be the sum of the grades obtained in both parts of the exercise questions.</p> <p>Durante el examen o prueba final (2ª convocatoria): As seen for the first one</p>
<p>Criterios de evaluación de las enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice assessment criteria</i></p>	<p>Durante la evaluación continua: During the completion of the EPD students must show the appropriate behavior that allows at all times the essential safety conditions.</p> <p>Involvement is fundamental in these activities. The initiative, interest and attention will be assessed. The progress of the activities and the achievements obtained are also valued.</p> <p>The student must submit their reports in time and suitable format. The reports must be clear and specific and must contain the essential information, showing clear understanding of the issues addressed.</p> <p>Durante el examen o prueba final (1ª convocatoria): Not applicable Durante el examen o prueba final (2ª convocatoria): Not applicable</p>
<p>Criterios de evaluación de las actividades académicas dirigidas (AD) <i>Criteria of assessment of guided academic activities</i></p>	<p>Durante la evaluación continua: As in the EPDs, participation is fundamental in these activities. The initiative, interest and attention performed will be scored.</p> <p>The constructive intervention in the debates that can be produced, as well as the exposition of innovative and creative ideas will always be well valued.</p> <p>The reports must contain well-reasoned reflections on the topic addressed and the discussion of it will be valued based on the known bibliography.</p> <p>Durante el examen o prueba final (1ª convocatoria): Not applicable Durante el examen o prueba final (2ª convocatoria): Not applicable</p>
<p>Puntuaciones mínimas necesarias para aprobar la Asignatura <i>Minimum passing grade</i></p>	<p>1ª convocatoria: To pass the subject, a minimum grade of 5 points is required in the final test.</p> <p>2ª convocatoria: To pass the subject, a minimum grade of 5 points is required in the final test.</p>
<p>Material permitido <i>Materials allowed</i></p>	<p>Only writing tools.</p>
<p>Identificación en los exámenes <i>Identification during exams</i></p>	<p>En cualquier momento de la realización de una prueba de evaluación los profesores podrán requerir la acreditación de la identidad de cualquier estudiante, mediante la exhibición de su carnet de estudiante, documento nacional de identidad, pasaporte u otro documento válido a juicio del examinador. Si no lo hiciese, el estudiante podrá continuar la prueba, que será calificada solo si la documentación es presentada en el plazo que el examinador establezca.</p>
<p>Observaciones adicionales <i>Additional remarks</i></p>	<p>Plagiarism Students have to remember that cheating and plagiarism are</p>



violations of University policy and are considered serious offenses and that the “Physiology, Anatomy and Cellular Biology Department” takes all incidences of academic dishonesty seriously and acts accordingly. Self-plagiarism” (the use of your own previous work in a different subject) is also not allowed in any of the activities of this subject.

Los estudiantes inmersos en un programa de movilidad o en un programa de deportistas de alto nivel, así como los afectados por razones laborales, de salud graves o por causas de fuerza mayor debidamente acreditadas, tendrán derecho a que en la convocatoria de curso se les evalúe mediante un sistema de evaluación de prueba única. Para ello, deberán comunicar la circunstancia al profesor responsable de la asignatura antes del fin del periodo docencia presencial.

*Students enrolled in a mobility program or a program for high-level athletes, as well as students affected by work or serious health problems or reasons of force majeure duly accredited, will have the right to be evaluated during the first session through a single test evaluation system. To do this, they must report changes in their circumstances to the program coordinator before the end of the teaching period.*

## 8. Bibliografía / Bibliography

Basic Literature	<ul style="list-style-type: none"> <li>• Richard W. Hill, Gordon A. Wyse, and Margaret Anderson (2012) “Animal Physiology”, <i>3rd edition. Sinauer Associates, Inc.</i></li> <li>• Randall, D., Burggren, W. and French, K. (2002) “Eckert Animal Physiology”, <i>5th Ed. W.H. Freeman.</i></li> </ul>
Additional Bibliography	<ul style="list-style-type: none"> <li>• Hall J.E. (2012) “Guyton and Hall Textbook of Medical Physiology”, <i>12th Edition. Saunders.</i></li> <li>• C.D. Moyes and P.M.Schulte (2007) “Principles of Animal Physiology: International Edition (2e”, <i>Pearson Higher Ed USA</i></li> <li>• Eric R. Kandel, James H. Schwartz, Thomas M. Jessell and Steven A. Siegelbaum (2012) “Principles of Neural Science”, <i>Fifth Edition. McGraw-Hill Companies Inc.</i></li> <li>• Thomas W. Sadler (2010) “Langman's Medical Embryology”, <i>(11th Editon). Lippincott Williams and Wilkins.</i></li> <li>• Kim E. Barrett, Susan M. Barman, Scott Boitano and Heddwen Brooks (2012) “Ganong's Review of Medical Physiology,”, <i>24th Edition. McGraw-Hill Companies Inc</i></li> <li>• Hochachka Peter W. and Somero George N. (2002) “Biochemical adaptation: mechanism and process in physiological evolution.”, <i>Oxford University Press</i></li> </ul>
Laboratory Manuals	<ul style="list-style-type: none"> <li>• Dee U. Silverthorn, Bruce R. Johnson and Alice C. Mills (2005) “Lab Manual for Physiology”, <i>Benjamin-Cummings Publishing Company.</i></li> </ul>