

Guía docente / *Course Syllabus*

2019-20

1. Descripción de la Asignatura / *Course Description*

Asignatura <i>Course</i>	FARMACOLOGÍA Y TOXICOLOGÍA (docencia en inglés)
Códigos <i>Code</i>	202107
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>	Optativas
Materia a la que pertenece <i>Subject it belongs to</i>	Optativas
Departamento responsable <i>Department</i>	Fisiología, Anatomía y Biología Celular
Curso <i>Year</i>	3º
Semestre <i>Term</i>	2º
Créditos totales <i>Total credits</i>	6
Carácter <i>Type of course</i>	Optativa
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 asíncrona), 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.

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2. Responsable de la Asignatura / *Course Coordinator*


Nombre <i>Name</i>	Juan Carlos Rodríguez Aguilera
Departamento <i>Department</i>	Fisiología, Anatomía y Biología Celular
Área de conocimiento <i>Field of knowledge</i>	Biología Celular
Categoría <i>Category</i>	Profesor Titular de Universidad
Número de despacho <i>Office number</i>	21.1.07
Teléfono <i>Phone</i>	954349380
Página web <i>Webpage</i>	https://www.upo.es/profesorado/jcrodagu
Correo electrónico <i>E-mail</i>	jcrodagu@upo.es

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

Breve descripción de la asignatura <i>Course description</i>	<p>The possibility of establishing new therapies and treatments for diseases depends largely on the possibility of obtaining effective, specific, abundant, low-cost drugs.</p> <p>For a drug to be marketed, it is necessary to conduct multiple experimental studies showing drug effectiveness and possible side-effects or even toxicity.</p> <p>Students will gain knowledge of metrics, pharmacokinetics and pharmacodynamics, and also basic skills required in the study of these areas. Students will be able to determine the magnitude of drug effects through development of dose-response curves.</p> <p>Finally, drug-drug interactions will be studied, updating classical detoxification metabolic pathways, rate-limiting enzyme activities and basic excretion pathways.</p>
Objetivos (en términos de resultados del aprendizaje) <i>Learning objectives</i>	<ul style="list-style-type: none">• To understand the basic mechanisms involved in drug toxicity• To predict drug clearance rates• To trace drug biotransformation and its secondary metabolites• To design effective drug dose-dependent curves• To select most effective drug administration modes
Prerrequisitos <i>Prerequisites</i>	Basic computer skills (Office suite and Internet browsing) are required.
Recomendaciones <i>Recommendations</i>	This course is largely supported on knowledge acquired in previous courses. Particularly, those included in Chemistry (chemical equilibria, pKa, logP) Biochemistry (enzyme kinetics, coupled reactions), Physiology (liver and kidney function), and Cell Biology (epithelia structure, gradients across membranes, bioenergetics). A strong background in those subjects is highly recommended.
Aportaciones al plan formativo <i>Contributions to the</i>	This course is an introduction to the basic knowledge of pharmacology and toxicology oriented to biomedical and

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<i>educational plan</i>	biotechnological fields. Particular attention will be paid to kinetics and dynamics of both drugs and toxics. Concepts of clearance, timing and dosage will be stressed. Detoxification and drug biotransformation, as well as excretion, will be showed as real models for drug discovery.
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4. Competencias / Skills

Competencias básicas de la Titulación que se desarrollan en la Asignatura <i>Basic skills of the Degree that are developed in this Course</i>	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 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
Competencias generales de la Titulación que se desarrollan en la Asignatura <i>General skills of the Degree that are developed in this Course</i>	CG3 - Utilizar con rigor la terminología, nomenclatura y sistemas de clasificación en cada una de las materias impartidas. 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. CG22 - Desarrollar las habilidades de aprendizaje necesarias que le permitan emprender, con un elevado nivel de autonomía, estudios posteriores.
Competencias transversales de la Titulación que se desarrollan en la Asignatura <i>Transversal skills of the Degree that are developed in this Course</i>	
Competencias específicas de la Titulación que se desarrollan en la Asignatura <i>Specific competences of the Degree that are developed in the Course</i>	CE11 - Conocer los fundamentos de la Química Combinatoria. CE73 - Describir, integrar y resolver problemas sobre las diferentes vías metabólicas y sus mecanismos de control.
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>	Basic and generic skills CB2. Proper use of the scientific knowledge to acquire and improve professionalism CB3. To develop critical thinking about key topics in science CG3. To improve proper use of scientific terms in academic activities including scientific analysis and synthesis. CG9. To understand management of scientific information using scientific databases, scientific papers and patents. CG22. To develop autonomous learning. Module skills CE11. To understand the essentials in combinatorial chemistry. CE73. To solve problems about metabolic pathways and their control mechanisms.

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

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PARTE I	LECTURES
TEMA 1	TOXICITY
1.1	Phases of intoxication and its evaluation.
1.2	Toxicology: analytical tools.
1.3	Therapeutics and drug toxicity.
TEMA 2	PHARMACOKINETICS
2.1	Drug distribution within the body, and bioavailability
2.2	Transportation models.
TEMA 3	PHARMACODYNAMICS
3.1	Mechanisms of action, drug-target interaction, enzymes and other biomolecules.
TEMA 4	DRUG DISCOVERY.
4.1	Farmacognosy.
4.2	Origin of pharmacologically-active molecules.
4.3	Critical factors on drug posology.
PARTE II	LAB SESSIONS
4.1	In vitro toxicity tests
4.2	Pharmacokinetics
4.3	Metabolic detoxification

6. Metodología y recursos / *Methodology and Resources*

Metodología general <i>Methodology</i>	<p>This course accounts for 6 ECTS credits (i.e. 150 hours) distributed as follows:</p> <ul style="list-style-type: none"> * Activities in-class 45 hours (28 sessions lectures + 17 hours labs). * Activities off-class 90 hours (homework). * Seminars 10 hours. * Evaluation 15 hours (exams, tests, questionnaires)
Enseñanzas básicas (EB) <i>General teaching</i>	<p>Attendance to basic teaching sessions is voluntary. These include a get-together of the main aspects of each part of the contents, paying attention to the most complex concepts. Session dynamics include frequent student interaction and problem-solving proposals. Some of these problems and others not treated in basic teaching sessions may be proposed as homework.</p> <p>Basic teaching sessions will take 28 hours (one hour per session):</p> <ul style="list-style-type: none"> * one kick-off session, for presentation and introduction to course rules * 27 sessions to go through four monthly topics along the academic spring semester <p>These sessions will cover the main aspects of the topics, paying attention to the most complex concepts. Session dynamics include frequent student interaction and problem-solving proposals. Some of these, and also others not covered by basic teaching sessions, may be proposed as homework.</p> <p>Before the lecture sessions, reading the associated handbook content is strongly recommended. You will get familiar with the main terms and ideas. Thus, following the lecture will be much easier.</p>

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	<p>During the sessions, the instructor will solve the questions and doubts raised in class. Lectures are quite interactive sessions and student participation is strongly promoted.</p> <p>Attendance to basic teaching sessions is voluntary although strongly recommended.</p>
<p>Enseñanzas prácticas y de desarrollo (EPD) <i>Theory-into-practice</i></p>	<p>These sessions include practical contents complementary to those in lectures. As a rule, there is no redundant content. Consequently, practical contents will not be covered or review in lectures.</p> <p>Before the lab sessions, lab brochures or hands out documentation must be read and understood in advance (completion of a questionnaire may be required).</p> <p>During the lab sessions, the lecturer will make a brief introduction to the goals of the session and the methodology to be used. The student will get familiar with laboratory techniques, lab safety and different pieces of equipment. Students will obtain their own results, and learn from the conclusions from the experiments.</p> <p>After the lab sessions, the conclusions including experimental work in the lab sessions (and some related non-experimental tasks) will be proposed as graded homework.</p> <p>Attendance to these sessions is compulsory unless absence is properly justified (written evidences may be required).</p> <p>Practical teaching sessions will take 7 hours. There will be 3 lab sessions (2-3 hours each). Lab sessions will take place at laboratory 23.B.04.</p>
<p>Actividades académicas dirigidas (AD) <i>Guided academic activities</i></p>	<p>Attendance to seminars sessions is required. These include planning, development and execution of a short project to perform a controlled clinical trial. Activities are carried out by students groups formed early in the spring semester.</p>

7. Criterios generales de evaluación / *Assessment*


<p>Primera convocatoria ordinaria (convocatoria de curso) <i>First session</i></p>	<p>El 60% de la calificación procede de la evaluación continua. El 40% de la calificación procede del examen o prueba final. Continuous evaluation weights 60% of the course grade, whereas the final exam accounts for 40%.</p> <p>Within Continuous evaluation, practical sessions (and associated lab quizzes) weight 10% of the course grade, and seminars (and associated homework) count 50% of the course grade.</p> <p>a) Practical sessions. Attendance to the practical sessions is compulsory, unless absence is properly justified (written evidence may be required).</p> <p>Evaluation of these in-class sessions will be based on quizzes (10% of overall course score)</p> <p>The quizzes will contain questions falling within one of these categories:</p> <ul style="list-style-type: none"> * Short answer * Long answer * Calculated answer * Concept matching * Combinations * Fill-in blanks * Scrambled answers * Multiple choice * True/False
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	<p>* Problem-solving</p> <p>The quizzes evaluate skills CB3, CG3 and CE73</p> <p>b) Seminar sessions (50% of the overall course score) The seminar sessions are intended to guide the creation of Pharmacology and Toxicology projects by groups of students. These projects (assignments) must meet the main legal and scientific requirements accepted in standard Pharmacology & Toxicology studies.</p> <p>The seminar sessions evaluate skills CG9 and CG22.</p> <p>c) Participation Participation is extra credit intended to upgrade those course grades falling in boundaries (C to B, or B to A grades). Participation will be graded according to Contributions to discussions, Answers to questions, Behavior and Attitude during the sessions. The exam (40% of the overall course score) will contain questions falling within these categories:</p> <ul style="list-style-type: none"> • Problem solving • Short answer • Pair matching • Combinations • Fill-in blanks • Multiple choice • True/False <p>The exam evaluates skills CB3, CG3, and CE11</p>
Segunda convocatoria ordinaria (convocatoria de recuperación) <i>Second session (to re-sit the exam)</i>	<p>According to University regulations, those students failing the course will have a resit exam to evaluate all course competences with full score opportunities. The resit exam accounts for 100% of the overall course score. The exam will contain questions falling into one of these categories:</p> <ul style="list-style-type: none"> • Problem-solving • Short answer • Long answer • Calculated answer • Pair matching • Combinations • Fill-in blanks • Scrambled answers • Multiple choice • True/False
Convocatoria extraordinaria de noviembre <i>Extraordinary November session</i>	<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>According to University regulations, those students failing the course will have a resit exam to evaluate all course competences with full score opportunities. The resit exam accounts for 100% of the overall course score. The exam will contain questions falling into one of these categories:</p>

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	<ul style="list-style-type: none"> • Problem-solving • Short answer • Long answer • Calculated answer • Pair matching • Combinations • Fill-in blanks • Scrambled answers • Multiple choice • True/False
<p>Crterios de evaluaci3n de las ensefanzas b3sicas (EB) <i>General teaching assessment criteria</i></p>	<p>Durante la evaluaci3n continua: Participation grades student involvement in the course. Active and consistent participation may promote upgrade to a higher grade category. Participation weights 5% of the global course grade as extra credit during the course.</p> <p>Durante el examen o prueba final (1ª convocatoria): Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers pointing to multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade.</p> <p>Some questions may include several related parts. Answers to these questions must be coherent.</p> <p>Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.</p> <p>Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course.</p> <p>Durante el examen o prueba final (2ª convocatoria): Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers pointing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade.</p> <p>Some questions may include several related parts. Answers to these questions must be coherent.</p> <p>Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.</p> <p>Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course.</p>
<p>Crterios de evaluaci3n de las ensefanzas pr3cticas y de desarrollo (EPD) <i>Theory-into-practice assessment criteria</i></p>	<p>Durante la evaluaci3n continua: Quizzes will be based on data and results obtained in the laboratory. Quizzes must provide coherent explanation to the lab results. Non-consistent results or incoherent explanations may dismiss the quiz grade. Quizzes grade weights 10% of the global course grade during the course. Answers to quizzes must be based on scientific hypotheses and</p>

experimental data obtained in the laboratory.
 Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.

Answers must be original. Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the assignment. Repeated plagiarism may lead to fail the course.

Durante el examen o prueba final (1ª convocatoria): Answers to quizzes must be based on scientific hypotheses and experimental data provided.

Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers showing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade.

Some questions may include several related parts. Answers to these questions must be coherent.

Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.

Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course.

Durante el examen o prueba final (2ª convocatoria): Answers in the exam must be focused on the questions provided. Answers focused on other aspects will not be considered or graded. Answers showing multiple alternatives, explanations or hypothesis will be equally graded. Thus, contradictory or incompatible alternatives will be equally weighted, decreasing the grade.

Some questions may include several related parts. Answers to these questions must be coherent.

Minimal grammatical and vocabulary competences are essential (B1 level). Handwriting must be minimally readable and understandable. Please avoid tiny letters or non-scientific abbreviations.


Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the exam. Repeated plagiarism may lead to fail the course.

Crterios de evaluaci3n de las actividades acad3micas dirigidas (AD)
Criteria of assessment of guided academic activities

Durante la evaluaci3n continua: The evaluation of this part of the course is based on the delivery of a written project. Projects will be designed by groups of students, must be original and based on scientific hypotheses. Project schedule will be self-planned by students, and the associated tasks assignment is a collaborative work online. Project development and execution is permanently supervised by the instructor.

These projects must meet the main legal and scientific requirements accepted in Pharmacology & Toxicology studies. Projects are teamwork, however project grades may differ according to the relative contribution of each group member.

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	<p>Projects grade weights 50% of the global course grade during the course.</p> <p>Minimal grammatical and vocabulary competences are essential (B1 level). Please avoid non-scientific abbreviations. Plagiarism will be prosecuted leading to dismiss the grade or even get a fail in the course.</p> <p>Durante el examen o prueba final (1ª convocatoria): These activities are not included in the final exam.</p> <p>Durante el examen o prueba final (2ª convocatoria): These activities are not included in the final exam.</p>
<p>Puntuaciones mínimas necesarias para aprobar la Asignatura</p> <p><i>Minimum passing grade</i></p>	<p>1ª convocatoria: A minimum of 4 points out of 10 must be obtained in each section in order to get the course weighted score (exam 40% + practices 10% + project 50%).</p> <p>Fail to reach these minimums score leads to the resit exam.</p> <p>2ª convocatoria: A minimum of 5 points out of 10 must be obtained in the exam to pass the course.</p>
<p>Material permitido</p> <p><i>Materials allowed</i></p>	<p>No electronic equipment is allowed during exams. This includes but not restricted to, tablets, cell phones, laptops or non-medical earphones.</p> <p>ID with photo (National ID, passport or UPO student card) may be required during exams.</p>
<p>Identificación en los exámenes</p> <p><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</p> <p><i>Additional remarks</i></p>	<p>This course is not a language course. At least B1 level of English language is needed to follow this course properly, although B2 level is strongly recommended. In all written tests (exams and quizzes) minimal grammatical and vocabulary competences are essential (B1 level).</p>


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

Course Handbook	<ul style="list-style-type: none"> • Curtis D. Klaassen (2008) “Casarett and Doull's toxicology : the basic science of poisons”, <i>McGraw-Hill</i> • Miles Hacker, William Messer, Kenneth Bachmann (2009) “Pharmacology: principles and practice.”, <i>Elsevier-Academic Press</i>
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