

## GUÍA DOCENTE

Curso 2013-2014

### 1. SUBJECT DESCRIPTION

<b>Degree:</b>	<b>Biotechnology</b>
<b>Course:</b>	<b>Pharmacology and Toxicology</b>
<b>Department:</b>	<b>Physiology, Anatomy and Cell Biology</b>
<b>Year:</b>	<b>2013-14</b>
<b>Semester:</b>	<b>2<sup>nd</sup> semester (spring semester)</b>
<b>ECTS credits:</b>	<b>6</b>
<b>Course:</b>	<b>3<sup>rd</sup></b>
<b>Type:</b>	<b>Optative</b>
<b>Language:</b>	<b>English</b>

<b>Model:</b>	<b>A2</b>	
<b>a. Basic Teaching (BT):</b>		<b>70%</b>
<b>b. Practical teaching (PT):</b>		<b>15%</b>
<b>c. Seminars (SM):</b>		<b>15%</b>

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### 2. Professors

#### 2.1. Coordinator: J uan Carlos Rodriguez Aguilera

#### 2.2. Teachers

<b>Name:</b>	<b>J uan Carlos Rodriguez Aguilera</b>
<b>School:</b>	<b>Experimental Sciences</b>
<b>Department:</b>	<b>Physiology, Anatomy and Cell Biology</b>
<b>Area:</b>	<b>Cell Biology</b>
<b>Category:</b>	<b>Senior Lecturer</b>
<b>Office hours:</b>	<b>Tuesdays 8:00-12:00 and Fridays 12:00-14:00</b> <b>Previous appointment required</b>
<b>Office:</b>	<b>Building 21; Office 1.07</b>
<b>E-mail:</b>	<a href="mailto:jcrodagu@upo.es"><u>jcrodagu@upo.es</u></a>
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### 3. TRAINING PLAN

#### 3.1. Goals

- 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

#### 3.2. Contribution to training plan

The possibility of establishing new therapies and treatment modalities diseases depends largely on the possibility of obtaining effective, specific, abundant, low-cost drugs.

For a drug to be marketed, it is necessary to conduct multiple experimental studies showing drug effectiveness and possible side-effects or even toxicity.

This course introduces to the basic knowledge of pharmacology and toxicology oriented to biomedical and 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, and excretion will be showed as real models for drug discovery.

In this way, 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.

Finally, drug-drug interactions will be studied, updating classical detoxification metabolic pathways, rate-limiting enzyme activities and basic excretion pathways.

#### 3.3. Recommendations or previous knowledge required

This course is partially supported on knowledge acquired in previous subjects. Particularly, those included in the *Biochemistry (enzyme kinetics)*, *Physiology (excretion)*, and *Cell Biology (cell/tissue structure)* areas. A brief overview of them prior to course beginning may be recommended.

Basic computer skills (Office suite and Internet browsing) are strongly recommended

English language B1 level is required for this course.

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### 4. COMPETENCES

#### 4.1 Degree competences developed within this subject

- Analysis and synthesis skills
- Information management
- Communication skills: improvement on speech and writing performance

#### 4.2 Course competences to be developed

- Professional skills
  - Development of pedagogical proceeding for science teaching
  - Improvement of computer information management
  - Scheduling and time management
- Attitudes
  - Criticism ability
  - Scientific judgement
  - Teamwork organization and performance

#### 4.3. Subject-specific competences to be developed

- Specialization in pharmacology: pharmacokinetics and pharmacodynamics.
- Clearance models based on complementary excretion mechanisms in animals.
- Toxicity molecular mechanisms: biological targets.

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### 5. CONTENTS (Topics)

#### BASIC TEACHING

1. Introduction to pharmacology and toxicology.
2. Toxicity: phases of intoxication and its evaluation. Toxicology: analytical tools. Therapeutics and drug toxicity.
3. Pharmacokinetics: drug distribution within the body, bioavailability.
4. Pharmacodynamics: mechanisms of action, drug-target interaction, enzymes and other biomolecules. Critical factors on drug posology.
5. Farmacognosy: Origin of pharmacologically-active molecules.
6. Farmacogenomics.

#### PRACTICAL TEACHING

Students will carry out practical activities designed to determine magnitude and effectiveness of pharmacological substances, side-effects and toxicity.

Practical teaching sessions will include:

- Session 1: *In vitro* toxicity tests.
- Session 2: Pharmacokinetics. Clearance: simple vs. complex models.
- Session 3. Detoxification: analysis of secondary metabolites.

#### SEMINARS

Seminars are integrated in both basic and practical teaching. Sessions will include briefing and debriefing activities related to practical teaching sessions. Problem-solving activities and in-depth scientific information search will be carried out related to basic teaching sessions.

Seminars sessions will include:

- Briefing for practical sessions #1 & #2: Protocol design and previous calculations
- Debriefing for practical sessions #1 & #2: data analysis and model prediction
- Problem-solving sessions
- Case-based sessions

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### 6. METODOLOGY AND RESOURCES

This course accounts for 6 ECTS credits (i.e. 150 hours) distributed as follows:

Activities	In-class (session hours)	Off-class (homework hours)	Evaluation (homework hours)	TOTAL
Basic	30	90	15	
Practical	7			
Seminars	8			
<b>TOTAL</b>	<b>45</b>	<b>90</b>	<b>15</b>	<b>150</b>

#### a) Basic teaching

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 aspects. 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.

#### b) Practical teaching

Attendance to practical teaching sessions is compulsory. These include experimental work in the lab sessions, and related non-experimental tasks as homework.

#### c) Seminars

Attendance to seminars is voluntary although strongly recommended. Practical sessions for planning (briefing) and results analysis (debriefing) take place in these sessions. Further, problem solving and doubts are made clear herein.

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### d) Timing

Adequate time management is essential. Thus, this subject is scheduled as described hereafter:

d1) basic teaching sessions will take 30 hours (one hour per session, Wed. & Thu. at 1pm, classroom to be confirmed):

- 1 kick-off session, for subject presentation and rules explanation
- 30 sessions to go through six 5-sessions topics along the academic spring semester.

Week	Wednesday	Thursday	Topic
1	29/01/2014	30/01/2014	Kick-off & Topic#1
2	05/02/2014	06/02/2014	Topic # 1
3	12/02/2014	13/02/2014	Topic # 1
4	19/02/2014	20/02/2014	Topic # 2
5	26/02/2014	27/02/2014	Topic # 2
6	05/03/2014	06/04/2014	Topic # 2-3
7	12/03/2014	13/03/2014	Topic # 3
8	19/03/2014	20/03/2014	Topic # 3
9	26/03/2014	27/03/2014	Topic # 4
10	02/04/2014	03/04/2014	Topic # 4
11	09/04/2014	10/04/2014	Topic # 4-5
12	23/04/2014	24/04/2014	Topic # 5
13	07/05/2014	08/05/2014	Topic # 5
14	14/05/2014	15/05/2014	Topic # 6
15	21/05/2014	22/05/2014	Topic # 6

d2) practical teaching sessions will take 7 hours. There will be 3 lab sessions (2-3 hours each). Lab sessions will take place on indicated Thursdays at 8:30 am (laboratory room to be confirmed).

Week	Lab sessions
#7	13/03/2014
#9	27/03/2014
#12	24/04/2014

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d3) seminars sessions will take 8 hours. There will be 4 sessions (2 hours each). Seminars sessions will take place on indicated Thursdays at 9 am (classroom to be confirmed).

Week	Seminar sessions
#6	06/03/2014
#10	03/04/2014
#11	17/04/2014
#13	08/05/2014

### e) Off-class activities and office hours

All off-class activities are evaluated. These must be uploaded using the [Virtual Campus tool](#). Announcements, marks, schedules or homework deadlines will also be run through this computer-based learning tool.

Office hours are intended for additional student assistance; this can be either face-to-face or on-line. However, in both cases previous appointment is always required.

### f) Tips for successful subject completion.

- Before each in-class session, please revise the key topic aspects and resources that are available online, search documentation list.
- During the in-class sessions, all doubts should be clarified addressing your questions. Try to obtain the most from the professor's time dedicated to in-class sessions.
- After the in-class sessions, perform your topic reports and revise them through a brief study.
- Keep timing as strict as possible.
- Teachers can be consulted during the whole semester either by e-mail, by phone or in person (office hours)
- Try to understand the biological processes that are covered in all the topics, avoiding memorization of unclear ideas.



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### 7. EVALUATION

According to University regulations, all written contents in exams, reports and quizzes must be original. Illegal copying of these will be prosecuted and may lead to a fail in the final mark.

The total score of this subject is distributed as follows:

*a) Basic teaching (70% of global score)*

Attendance to the EB sessions is voluntary. This teaching component will be evaluated by written quizzes and **two** written topic reports.

The basic teaching (70% of global subject score) is distributed according to this **homework**:

- Topic-specific quizzes (30% of global subject score)
- Two random-selected topic reports (40% of global subject score)

The quizzes will contain questions falling within one of these categories:

- Short answer
- Long answer
- Calculated answer
- Concept matching
- Combinations
- Fill-in blanks
- Scrambled answers
- Multiple choice
- True/False
- Problem solving.

The topic reports must contain:

- Title and authors
- Table of contents (follow each *key topic contents*, see online resources)
- Report body
- Summary / conclusions
- Bibliography

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Quizzes and reports homework intends to test the knowledge acquired during the semester, and the ability to solve specific biological problems. In all written tests (reports, exams and quizzes) minimal grammatical and vocabulary competence (B1 level) will be required.

*b) Practical & Seminar sessions (30% of global score)*

Attendance to the practical sessions is compulsory, unless absence is properly justified. Evaluation of these in-class sessions will be based on this **homework**:

- Practical sessions quizzes (20% of global score)
- Seminar sessions teamwork (10% of global score)

The quizzes will contain questions falling within one of these categories:

- Short answer
- Long answer
- Calculated answer
- Concept matching
- Combinations
- Fill-in blanks
- Scrambled answers
- Multiple choice
- True/False
- Problem solving.

The teamwork will be collaborative tasks to be completed on-line. Students groups will be formed early in the spring semester.

According to University regulations, those students failing the final mark will have a resit exam in July with full score opportunities. The resit exam accounts for 100% of the final score. The exam will contain questions falling within one of these categories:

- Short-answer
- Problem-solving
- True/False

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### 8. RECOMMENDED LITERATURE

Title	Authors	Editorial	Year
Casarett and Doull's toxicology : the basic science of poisons	Curtis D. Klaassen	McGraw-Hill	2008 (7 <sup>th</sup> Ed.) 2001(6 <sup>th</sup> Ed.)
Pharmacology: principles and practice.	Miles Hacker, William Messer, Kenneth Bachmann	Elsevier-Academic Press	2009
Basic pharmacology : understanding drug actions and reactions	Maria A. Hernández, Appu. Rathinavelu	CRC, Taylor & Francis	2006
Applied pharmacokinetics & pharmacodynamics : principles of therapeutic drug monitoring	Michael E. Burton... [et al.]	Lippincott Williams & Wilkins	2006