



**PHARMACOLOGY**  
**Year 2016-17**

1. Descriptive data .....	1
2. Contextualization of content and subject competences.....	2
3. Specific competences.....	2
4. General competences .....	2
5. Content. ....	3
6. Training activities. ....	4
7. Teaching methodology. ....	4
8. Assessment procedures.....	4
9. Materials and other considerations.....	6
10. Bibliography.....	7
11. Coursework outline.....	7
12. Resources.....	8



## 1. Descriptive data

<b>Name of subject : PHARMACOLOGY</b>	
<b>Code: 9970001309</b>	
<b>Degree program: BIOTECHNOLOGY</b>	
<b>Year in which is taught : 3rd</b>	
<b>Nº of ECTS credits: 6</b>	<b>Nº of classroom hours: 72h</b> <b>Study mode: CLASSROOM</b>
<b>Regulatory prerequisites: N/A</b>	<b>Recommended prerequisites:</b> Chemistry, biochemistry and physiology
<b>Associate professor: Olga Castelao and Olga Greciano</b>	
<b>Academic advising/guidance timetable:</b> 1 h/week (request appointment previously via email)	

## 2. Contextualization of content and subject competences.

Pharmacology is a compulsory subject of 6 ECTS credits, which is taught on a quarterly basis in the third year of the Biotechnology degree. This subject belongs to module V "SYSTEMS BIOLOGY AND PHYSIOLOGICAL INTEGRATION" which has a total of 33 ECTS credits.

Pharmacology is the study of drugs, studying the mechanism of action, actions and pharmacological effects, therapeutic indications and clinical uses, interactions, adverse effects and contraindications.

## 3. Specific competences.

On completing this subject, the student will be able to:

1. Know the origin, actions and effects of substances with pharmacological activity
2. Study the mechanisms of action, indications, interactions and side effects of the most important drugs
3. Know the principles of basic and applied research

## 4. General competences

The following competences will be developed and assessed in this subject:

1. Work management
2. Formulate hypotheses, collect and critically evaluate information for problem solving, following the scientific method
3. Using information and communication technology relevant to the field of study.



## 5. Content.

Unit 1: General principles of pharmacology.

Unit 2. International Classification of drugs: ATC.

Unit 3. Mechanisms of action of drugs.

Unit 4. Adverse reactions and drug interactions

Unit 5. Drug Research. Clinical trials

Unit 6. Digestive system pharmacology.

Unit 7. Pharmacology of the autonomic nervous system. Sympathomimetic and sympatholytic drugs. Cholinergic and anticholinergic drugs.

Unit 8. Neuromuscular blockers

Unit 9. Cardiac pharmacology. Inotropic. Antiarrhythmic. Antianginal drugs.

Unit 10. Antihypertensive and Diuretics

Unit 11. Lipid lowering drugs.

Unit 12. Pharmacology of hemostasis and coagulation

Unit 13. Insulins and oral antidiabetic drugs

Unit 14. Analgesics and NSAIDs.

Unit 15. Opioid analgesics.

Unit 16. Antidepressants.

Unit 17. Anxiolytics

Unit 18. Antiepileptic drugs.

Unit 19. Antihistamines

Unit 20. Other drugs that act on the central nervous system. Antiparkinson drugs. Antimigraine drugs. Neuroleptics.

Unit 21. General principles of the use of antibacterial drugs

Unit 22. Beta-lactam antibiotics.

Unit 23. Macrolides, Clindamycin and Metronidazole.

Unit 24. Other antibiotics. Fluoroquinolones, aminoglycosides, sulfonamides, tetracyclines and vancomycin.

Unit 25: Antifungals and antivirals.

Unit 26: Antiseptics and disinfectants.

Unit 27: Respiratory Pharmacology. Bronchodilators. Expectorants. Antitussives.

Unit 28: Pharmacology of bone.

Unit 29: Cytostatics.



## 6. Training activities

An active teaching methodology will be used in the classroom in order to promote contents integration and develop the competences and skills of the subject. There will be individual or group activities, some of them are mandatory and others voluntary.

- Lectures: encouraging discussion and student participation.
- Problems and case studies, individually or in small groups:
- Tutorials, assessment and self-study

## 7. Teaching methodology.

The teaching methodology involves a mixed system where more traditional strategies such as lectures and class exercises, are combined with teaching based on experiences and real-life situations, and the use of online tools through the blackboard platform (questionnaires and surveys, forums, etc.) as support for the activities of teachers and students. Of course, an updated bibliography and strong scientific web resources will be available to students to support all activities.

## 8. Assessment procedures.

### ORDINARY ASSESSMENT

It is done through continuous assessment of the different training activities during the whole semester.

To pass the course the student must obtain:

- A grade equal or greater than 5 in each of the written tests
- A grade equal or greater than 5 of the weighted arithmetic mean of the active learning activities

The final grade for the course will be the weighted arithmetic mean of each of the training activities.

Activities and their weights in the final grade of the subject:

#### a. ASSESSMENT OF SELF-KNOWLEDGE

### **Midterm tests (60% of the final grade)**

Two knowledge test of multiple choice type questions and / or short essay questions

#### □ First midterm test:

- First part (units 1-14). May 2017. This test represents **25% of the final grade**



□ Second midterm test:

- Students who have a grade of 5 or higher in the 1st midterm test:

- Second Part (units 15-29). June 2017. This test represents **35% of the final grade**.

90% of contents of the second part of the course and 10% of contents of the first part of the course

- Students who have less than 5 in the first part: the second midterm test will consist of two parts (students must obtain at least a 5 in each part to pass the test):

- Part 1: units 1-14, **25 % of the final grade**
- Part 2: units 15-29 (same as those who have passed the first part), **35% of the final grade**

b. ASSESSMENT OF ACTIVE LEARNING ACTIVITIES (individual or group activities) **40% of the final grade**

The content of the activities will be reflected in the midterm tests

1. ATC CLASSIFICATION AND SUMMARY OF PRODUCT CHARACTERISTICS

The grade of this activity represents **10% of the final grade**

2. MINITEST

Multiple choice questions tests will be conducted at the end of some teaching units

The grade of this activity represents **20% of the final grade**

3. CLINICAL TRIALS

An activity related to clinical trials

The grade of this activity represents **10% of the final grade**

The weighted arithmetic mean of these active learning methodologies **must be equal to or greater than 5 to pass the subject**

For students taking classroom lessons, it is necessary to justify, at least 50% of attendance at classes, as a necessary part of the evaluation process and to comply with the student's right to receive advice, assistance and academic guideline by the teacher. To this end, students should use the technological system that the University offers to prove his daily attendance at each of their classes. The system will also serve to ensure objective information on the active role of the



student in the classroom. The lack of accreditation by the means proposed by the University of 50% of attendance shall entitle the teacher to grade the subject as fail in the ordinary call.

### **EXTRAORDINARY ASSESSMENT:**

Those students whose final grade is less than 5, will be considered to have failed the educational objectives of the course and will have to attend the extraordinary call and retake the midterm tests and or active learning activities graded below 5.

The extraordinary call shall be equivalent to the ordinary (contents and assessment). Students must retake only the activities that are graded below 5.

If the student does not pass all the different parts in the extraordinary call, the student will receive a failing grade, and will have to repeat all the activities the next academic year.

## **9. Materials and other considerations**

**Materials:** Digital whiteboard, information for collaborative and case study activities

## **10. Bibliography:**

### *BOOKS:*

- DiPiro et al., Pharmacotherapy. A pathophysiologic Approach. 6th ed. 2005, Mc Graw-Hill.
- Flórez, J., Armijo. J.A., Mediavilla, A., Farmacología humana. 2008. Masson S.A.
- Flórez, J., Armijo. J.A., Mediavilla, A., Farmacología humana. 2013. Masson S.A. e-book
- Goodman, L.S., Gilman, A., Las bases farmacológicas de la terapéutica. 2009. McGraw-Hill Interamericana.
- Lorenzo, P., Moreno, A., Leza, J.C., Lizasoain, I., Moro, M.A. Velázquez, Farmacología Básica y Clínica. 2013. Ed. Medica Panamericana.
- Setter, F.H., Raffa, R.R., Rawls, S.M., Beyzarov, E.P. Farmacología Ilustrada 2008. Elsevier Masson.
- Rang, H.P., Dale, M.M., Ritter, J. M. Farmacología. 2012. Elsevier Churchill Livingstone
- Vademecum Internacional. Ed. UBM Medica, 2011
- Rang&Dale's Pharmacology. 7th Ed. 2012. Elsevier (hard copy and e-book)

### *OTHER REFERENCES:*

CGCOF database (BOT): <http://www.portalfarma.es>

<http://www.farmacia.org>

Novartis: <http://www.novartis.com>



DrugInfo: <http://www.drugfonet.com>

Globalmed: <http://www.globalmed.es>

BIAM: <http://www2.biam2.org>

FDA: <http://www.fda.gov/cder/drug/default.htm>

The Internet Drug Index: <http://www.rxlist.com/cgi/generic/index.html>

Medscape DrugInfo: <http://www.medscape.com/druginfo>

Drug information, Ministerio de Sanidad, Servicios Sociales e Igualdad:

<http://www.msssi.gob.es/profesionales/farmacia/informaMedicamentos/home.htm>

Drug information, Sistema Nacional de Salud

[http://www.msssi.gob.es/biblioPublic/publicaciones/recursos\\_propios/infMedic/home.htm](http://www.msssi.gob.es/biblioPublic/publicaciones/recursos_propios/infMedic/home.htm)

Spanish Medicine Agency (Agencia española de Medicamentos y Productos Sanitarios):

<http://www.aemps.gob.es/>

Drugs authorized in Spain (human use):

<http://www.aemps.gob.es/medicamentosUsoHumano/portada/home.htm>

Drugs in clinical trials: <http://clinicaltrials.gov/>

## 11. Coursework outline.

		Activities outside the classroom
<b>WEEKS 1-2</b>	Introduction and general pharmacology	Self-study and individual activities
<b>WEEK 3</b>	Gastrointestinal and ANS drugs	Self-study and flipped classroom
<b>WEEK 4</b>	ANS drugs	Self-study
<b>WEEK 5</b>	Cardiovascular system drugs	Self-study
<b>WEEKS 6-7</b>	Pharmacology of hemostasia, treatment of diabetes and NSAIDs  First midterm exam (unit 1-14)	Self-study
<b>WEEKS 7-10</b>	CNS pharmacology and anti-infective drugs	Self-study
<b>WEEK 11</b>	Respiratory system and chemotherapy	Self-study
<b>WEEK 12</b>	Second midterm	Self-study



## **12. Resources.**

Management of information using databases

Blackboard as a virtual platform for communication and exchange of information.

Rubrics for the assessment of active learning activities and competencies will be used. Rubrics are given to students.