Teaching guide

IDENTIFICATION DETAILS

Degree:	Pharmacy
Scope	Pharmacy
Faculty/School:	Experimental Sciences
Course:	PHARMACOGENETICS AND PHARMACOGENOMICS
Type:	Compulsory
ECTS credits:	3
Year:	4
Code:	2547
Teaching period:	Eighth semester
Subject:	Pharmacology
Module:	Medicine and Pharmacology
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	75

SUBJECT DESCRIPTION

The subject of Pharmacogenetics and Pharmacogenomics addresses the study of genetic factors that determine the pharmacotherapeutic response, as well as the tools used in their identification and characterization. The disciplines of pharmacogenetics and pharmacogenomics operate in the context of so-called personalized medicine, which presents itself as an immediate future in healthcare practice, and whose fundamental objective is to maximize the effectiveness and safety of health resources.

GOAL

To know the impact of genetic variants, more or less frequent in the population, on the variability of the response to drugs and the occurrence of adverse effects, and to understand how their analysis can contribute to the optimal management of patients in regular clinical practice, as a fundamental pillar of so-called personalized medicine.

PRIOR KNOWLEDGE

The student who accesses the subject of Pharmacogenetics and Pharmacogenomics must have a solid background in pharmacology and fundamental knowledge of genetics in order to be able to properly assimilate the subject.

COURSE SYLLABUS

Block I. Foundations of Pharmacogenetics and Pharmacogenomics.

Topic 1. What are pharmacogenetics/pharmacogenomics and why are they important? Personalized medicine and drug R&D.
Theme 2. Genetic diversity in the population.
Theme 3. Technologies applied to pharmacogenetics. Genotyping. Bioinformatics tools useful in pharmacogenomic research.
Topic 4. In which molecules are genetic polymorphisms searched for? Conveyors. Enzymes linked to drug metabolism. Drug targets.
Topic 5. Adverse drug reactions. Social and economic impact. Genetic risk factors. Importance of pharmacogenetics and pharmacogenomics.

Block II. Pharmacogenetics and pharmacogenomics in clinical practice.

Theme 6. Pharmacogenetics and pharmacogenomics in oncology. Importance in clinical practice. Pharmacogenomic research in oncology.
Topic 7. Pharmacogenetics and pharmacogenomics of cardiovascular disease. Pharmacogenetics and pharmacogenomics of lipid-lowering drugs and anticoagulant therapy.
Topic 8. Pharmacogenetics and pharmacogenomics of infectious diseases. Antiretroviral treatment.
Topic 9. Pharmacogenetics and pharmacogenomics of psychiatric diseases. Pharmacogenetic biomarkers in

psychiatry: pharmacokinetic and pharmacodynamic biomarkers.
Topic 10. Pharmacogenetics of pain and anaesthesia.
Topic 11. Pharmacogenetics and pharmacogenomics of other diseases and disorders: pharmacogenetics and pharmacogenomics of chronic inflammatory and osteoarticular diseases. Pharmacogenomics in Neurology. Pharmacogenomics of proton pump inhibitors.

Block III. Personalized medicine: other topics of interest.

Topic 12. Nutrigenetics and nutrigenomics.

EDUCATION ACTIVITIES

Theory classes (AFP1), Practice classes (AFP2), Seminars and/or presentation of works (AFP5), Tutoring (AFP6) Taking exams (AFNP1) Study of theory, exercises and problems (AFNP2) Preparation and study of practices (AFNP3) Preparation of works (AFNP4) Preparation of tutorials (AFNP5) Description: The classes of the subject of Pharmacogenetics and Pharmacogenomics will make use of a combined methodology, in order for students to achieve the proposed objectives. In the face-to-face sessions, the expository lesson given by the teacher of the subject will alternate and/or combine with the discussion of scientific articles and the resolution of issues of various kinds, such as clinical cases, in seminars. Active learning methodologies will be used, such as flipped classroom, problem-based learning and collaborative work. The virtual platform of the course will serve as a fundamental support tool for learning. In addition, tutoring will take place.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
34 Horas	41 Horas

Cross Skills

To nurture an attitude of intellectual curiosity and a quest for truth in all areas of life.

To be able to approach a subject by means of rigorous, profound and comprehensive thought.

To be able to assess knowledge acquired.

To be able to apply the theoretical knowledge learnt in the of solving problems and practical cases linked to the various subjects.

LEARNING RESULTS

Use medicines safely, taking into account their physical and chemical properties, including any risks associated with their use.

Promote the rational use of medicines and medical devices.

Know the properties and mechanisms of action of drugs.

Know the analytical techniques related to laboratory diagnostics, toxins, food and the environment.

Know and understand the techniques used in the design and evaluation of preclinical and clinical trials.

Evaluate the effects of substances with pharmacological activity.

SPECIFIC LEARNING RESULTS

Identify the genes that code for enzymes and transporters that influence the pharmacokinetics and pharmacodynamics of drugs.

Explain the most recent advances in pharmacogenetics and pharmacogenomics in the different therapeutic areas.

Describe the applications of genomic tools to Pharmacology.

Identify bioinformatics tools useful in pharmacogenomic research.

Apply the interpretation of laboratory data in monitoring therapeutic efficacy and safety.

Clearly understand and relate the relevance of genetic factors in the variability of drug responses.

Discuss the influence of genetic factors on drug response.

Develop a critical spirit with respect to the evidence and implications of both pharmacogenetics/pharmacogenomics and nutrigenetics/nutrigenomics in personalized medicine.

Assess the role played by pharmacogenetics and pharmacogenomics in current therapy.

Argue how the implementation of pharmacogenetics and pharmacogenomics in healthcare practice can contribute to increasing the efficacy and safety of treatments, as well as to reducing healthcare costs.

LEARNING APPRAISAL SYSTEM

REGULAR EVALUATION SYSTEM
This is the priority evaluation system for the subject. This system is based on continuous evaluation and distributes the final grade of the subject into different sections. Thus, for the calculation of the final grade of the subject, the weighting of the different sections will be as follows:

SE1: written exam: 60%
SE2: daily activities and exercises: 10%
SE3: preparation of individual and group work: 25%
SE4: attendance and participation in face-to-face classroom activities: 5%
The daily activities, exercises and work that are delivered after the deadline established for this purpose will NOT be taken into account for the evaluation. This weighting will be applicable to the ordinary call, provided that the student attends at least 70% of the classes and activities carried out in the classroom. In the event of non-attendance and/or in an extraordinary call, students should contact the teacher to find out about the evaluation criteria specific to their case. Attendance at all practical sessions (regardless of where they take place: laboratory, computer rooms, etc.) is mandatory. The unjustified absence of any of these sessions leads to the loss of the right to an internship evaluation in the ordinary call and a suspension of the course. Students in this situation should immediately contact the teacher. Practices will be evaluated through a written exam. Passing this exam (minimum score of 50% of the maximum grade) is essential to be able to pass the subject.
Passing the subject: to consider the theory (theory exam) and practical parts, for the calculation of the final grade, each of them must be approved. The course is approved with a grade equal to or greater than 5. If the theory part is passed but not the practical part, the score of the theoretical exam will be kept until the extraordinary call. The same will happen if the practical part is approved but not the theoretical part. The grades obtained in the rest of the evaluable concepts ('Carrying out daily activities and exercises', 'Preparation of individual and group works', 'Attendance and participation in face-to-face activities in the classroom') will be maintained until the extraordinary call.
ALTERNATIVE EVALUATION SYSTEM
This system is intended for repeat students who do not take advantage of the ordinary evaluation system because they cannot attend classes on a regular basis. Students in second or subsequent enrollment must contact the teacher to request to take advantage of this alternative evaluation system, in which face-to-face activities in the classroom (SE2: 'Performing daily activities and exercises', SE4: 'Attendance and participation in face-to-face activities in the classroom') will be replaced by individual or small group learning monitoring activities. As for first-time students, attendance at all practical sessions will be mandatory. Thus, for the calculation of the final grade of the subject, the weighting of the different sections will be as follows:
SE1: written exam: 60%
SE2: individual and group learning monitoring activities: 15%
SE3: preparation of individual and group work: 25%
Important note: Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the Evaluation Regulations and the University's Coexistence Regulations.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed

necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Edited by Russ B. Altman, David Flockhart, David B. Goldstein. Principles of Pharmacogenetics and Pharmacogenomics/New York: Cambridge University Press, 2012.
(Edited by Russ B. Altman, David Flockhart, David B. Goldstein. Principles of Pharmacogenetics and Pharmacogenomics/New York: Cambridge University Press, 2012. , ||Juan Sabater Tobella, Gloria Sabater Sales (eds.). Postgenomic personalized medicine: basic concepts for clinicians/Barcelona: Elsevier, 2010.)