Research Methods in Pre-clinical Pharmacology

Code: 42361
ECTS Credits: 9

2025/2026

Degree	Type	Year
Pharmacology	OT	0

Contact

Name: Francesc Jimenez Altayo

Email: francesc.jimenez@uab.cat

Teachers

Joaquim Hernández Martín

Carles Cristòfol Adell

Lidia Gimenez Llort

Angel Gonzalez Wong

Miguel Angel Vicente Martínez

Alheli Rodriguez Cortes

(External) A. Guzmán

(External) A. Norniella

(External) A. Pujol

(External) D. López

(External) G. Encina

(External) J. Hernández

(External) J. L. Montero

(External) JL Ruiz

(External) J.M. Cendros

(External) L. Canut

(External) L. Navarro

(External) M. Aulí

(External) N. Prats

(External) R. Mollà

(External) S. Martínez de Cripan

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no special prerequisites.

Objectives and Contextualisation

To apply basic pharmacological and methodological knowledge to develop preclinical drug research and interpret the results.

Competences

- Design and conduct research on drugs.
- Generate innovative ideas.
- Interpret one's own and other results of research on drugs.

Learning Outcomes

1. Apply models to describe and predict the time course of drug concentrations and their pharmacological response.
2. Generate innovative ideas.
3. Interpret models to describe and predict the time course of drug concentrations and their pharmacological response
4. Plan, design, use and interpret studies (not on humans) with the aim of evaluating the effects of drugs and their mechanism of action.
5. Plan, design, use and interpret studies (not on humans) with the aim of evaluating the time course of drug concentration in biological tissues and its relation to the effects observed.
6. Plan, design, use and interpret studies (not on humans) with the aim of evaluating toxicity and possible adverse reactions.
7. Recognise and apply the ethical and quality requirements for conducting non-clinical research with drugs.

Content

a) Evaluation and validation of a pharmacological target. Molecular screening: automation and high performance. Levels of pharmacological research: computer (in silica), cells, organs, animals, humans. In vitro studies: molecular for the evaluation of targets, cell cultures (biochemical and molecular), isolated organs (physiological, biochemical and molecular). Ex vivo studies. Methodologies used in in vivo studies: conscious animal and anesthetized animal (measurement of blood pressure). Animal models of diseases induced by administration of compounds, by surgical intervention or by genetic manipulation. Methodologies for studies of psychotropic drugs.

b) In silico studies. In vitro studies: physical-chemical characterization (release, dissolution). In vitro studies: metabolism. In vivo studies: handling of animals, choice of species. In vivo studies: design. Microdialysis techniques. Plasma protein binding. Animal / human extrapolation (allometry): data analysis. Toxicokinetics and special pharmacokinetics.

c) Mechanisms of toxicity. In vitro toxicity studies. In vivo toxicity studies: single administration. In vivo toxicity studies: repeated administration. Toxic-anatomopathology. Reproductive toxicology: infertility, teratogenicity (embryotoxicity). Genotoxicity Carcinogenesis Phototoxicity Immunotoxicity Local tolerability Behavior tests

d) Ethics of animal research. Ethical committees BPLs: Good Laboratory Practices. Guidelines for pre-clinical research of Regulatory Agencies. Legislation. Preclinical information for registration. Study of patent situation.

e) Models, development strategies / techniques: empirical, mechanistic. Theory of statistical moments. Convolution / deconvolution: theory and applications. Non-linear adjustment. Population approximation. Sensitivity analysis and biases: strategies and applications.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom practices (PAUL)	11	0.44	1, 2, 3, 5, 4, 6, 7
Clinical case seminars (SCC)	4	0.16	1, 2, 3, 5, 4, 6, 7
Master Class (TE)	50	2	1, 2, 3, 5, 4, 6, 7
Practical Experimental Laboratory (PLAB)	3	0.12	1, 2, 3, 5, 4, 6, 7
Type: Supervised			
Review of papers	24	0.96	1, 2, 3, 5, 4, 6, 7
Unscheduled tutorials	3	0.12	1, 2, 3, 5, 4, 6, 7
Type: Autonomous			
Study, written works ...	127	5.08	1, 2, 3, 5, 4, 6, 7

The final grade is the arithmetic mean of the grades obtained in the subjects that compose it.

Use of Artificial Intelligence (AI): The use of AI technologies is permitted only for support tasks (such as information search, text correction, or translations) and in specific activities as indicated. Students must clearly identify the parts generated with AI, specify the tools used, and include a critical reflection on how these influenced the process and final outcome. Non-transparent use of AI will be considered a breach of academic integrity and may result in penalties.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance and participation	10 %	0	0	1, 2, 3, 5, 4, 6, 7
Oral presentations	42,5 %	2	0.08	1, 2, 3, 5, 4, 6, 7

Short questions exam	47,5 %	1	0.04	1, 2, 3, 5, 4, 6, 7

The final grade is the arithmetic mean of the grades obtained in the subjects that compose it.

Students who do not take both the theoretical and practical assessment tests will be considered "Not Evaluable", exhausting their rights to enroll in the subject.
This subject/module does not provide for the single assessment system.

Bibliography

Updated bibliography will be provided for ech subject.

General bibliography

- Burton LL, Lazo JS, Parker KL. Goodman & Gilman. *Las Bases Farmacológicas de la Terapéutica*. 13a Edición. Madrid: McGraw-Hill Interamericana de España S.L., 2018.

- Doménech J, Martínez J, Plá JM. *Biofarmacia y Farmacocinética Volumen I: Farmacocinética*. Madrid: Editorial Síntesis, 2000.

- Fundación Genoma España. *Guia de desarrollos preclínicos*. Genoma España. 10 aniversario (2002-2012). https://www.agenciasinc.es/Noticias/Genoma-Espana-publica-una-guia-de-desarrollos-preclinicos

- Kenakin TP. *Pharmacology in Drug Discovery and Development*. 2nd Edition. London: Academic Press, 2016.

- Lorenzo P, Moreno A, Leza JC, Lizasoain I, Moro MA, Portolés A. *Velazquez. Manual de farmacologia basica y clinica*. Madrid: Editorial Médica Panamericana, 2021.

- Rosenfeld GC, Loose DS. *Pharmacology*. 4th Ed. Baltimore: Lippincott Williams & Wilkins, 2006.

- Weisman RS, Smith C, Goldfrank LR. *Toxicokinetics. Applying pharmacokinetic principles to the poisoned patient*. In: Hoffman RS, Goldfrank LR eds. Critical Care Toxicology (Contemporary management in critical care). New York: Churchill Livingstone, 1991 (vol 1; no 3): 21-42.

- Young-Jin S, Shannon M. *Pharmacokinetics of Drugs in Overdose*. Clinical Pharmacokinetics 1992; 23 (2): 93-105.

Software

No special software is required.

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAULm) Classroom practices (master)	101	Catalan	first semester	morning-mixed

(SCCm) Clinical case seminars (master)	101	Catalan	first semester	morning-mixed
(TEm) Theory (master)	101	Catalan/Spanish	first semester	morning-mixed