UAB
Universitat Autònoma de Barcelona

Basic Advanced Pharmacology

2026/2027

Code: 42359
Credits: 9

Degree programme	Type	Course
Pharmacology	OB	0

Contact lecturer

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Teaching staff

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Rosa Maria Morros Pedros
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Teaching staff (external to UAB)

Carles Fabregat
Flor Correa
Bárbara Tazón
Montserrat Carrascal

Group languages

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

Prerequisites

Basic knowledge of physiology, biochemistry and cell biology taught in degrees belonging to Health Sciences, Biosciences, and Sciences.

Objectives

Acquire the basic scientific knowledge of pharmacology and deepen into the knowledge of the physiological, biochemical and genetic concepts that support them. Introduction to the criteria for clinical use of drugs.

Learning outcomes

1. Desenvolupar habilitats d'autoaprenentatge.
2. Capacitat d'anàlisi i síntesi.
3. Desenvolupar un pensament crític i autocrític.
4. Define the different stages of drugs' transit through the organism.
5. Interpret the clinical implications of the basic concepts in pharmacology: clinical response and adverse effects.
6. Describe the characteristics of drugs.
7. Analyse the drug-pharmacological effect relationship.
8. Explain the mechanism of action of drugs as modifiers of biological activity.
9. Identify the principles of genetics, molecular biology and cell biology that underlie the structure, action and effects of drugs.
10. Analyse the origin of variation in response to drugs.

Contents

a) Pharmacokinetics: concepts, definitions, objectives and LADME processes. Release: concept and importance of galenic formulation, definitions (pharmaceutical form, formulation, etc.), impact of the pharmaceutical form on therapeutic efficacy, drug stability. Pharmaceutical forms: dissolution / suspension, topical administrations (emulsions, transdermal patches, solid formulations, new technologies). Absorption. Distribution. Metabolism. Excretion. Compartmental Models. Non-compartmental Models and independent model methods. Kinetics dose / dependent time. Kinetics of metabolites. Relation between kinetics and dynamics: PK-PD modeling. Clinical impact of pharmacokinetic parameters. Design of the posology guidelines: pharmacokinetic and pharmacodynamic factors.

b) Pharmacodynamics: definition and basic principles. Action and pharmacological effect. Concept of pharmacological selectivity and reversibility. Concentration curve / effect: description of the main parameters that describe this relationship. Pharmacological targets: receptors, enzymes, ion channels, carriers and cellular structures. Receptor-mediated actions: receptor concept, drug-receptor interaction (kinetic and occupational theories), agonism and pharmacological antagonism, structural characteristics of the main types of receptors. Receptor regulation: sensitization and desensitization, constitutive state of a receptor, reserve receptors. Pharmacological actions mediated by ion channels: types of ion channels. Enzyme-mediated pharmacological actions: different mechanisms of drug-enzyme interaction, types of enzymes as pharmacological targets. Pharmacological actions mediated by carriers. New pharmacological targets: genes, exogenous receptors. Temporary aspects of the pharmacological response: tolerance, sensitization.

c) Definitions and historical evolution. Basic elements of molecular biology, the human genome, protein biosynthesis. Pharmacogenetics: expression of polymorphisms with pharmacokinetic or pharmacodynamic implications. Impact of pharmacogenetics on therapeutic efficacy and adverse effects. Pharmacogenomics. Pharmacoproteomics: protein configuration and therapeutic efficacy. Systems biology: metabolomics and cytomics. Personalized pharmacology. Bioethical aspects.

d) Clinical response to drugs and their measurement. Treatment of symptoms, modification of the evolution of the disease, healing and prevention. Clinical events versus subrogated variables. Adverse effects and their identification: toxic effects, classification of adverse effects according to different dimensions (mechanisms of production, frequency, severity, etc.), causality. The benefit / risk relationship in the administration of drugs. Overdose and poisoning: basic principles of intervention.

e) Patient's own factors (sex, age, race, etc.): examples. Factors characteristic of the patient's pathology (alterations of the organs and systems responsible for the absorption, distribution and elimination processes): examples. Pharmacological interactions with drugs and other substances: examples.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Theory lessons	49.5	1.98	2, 3, 4, 5, 6, 7, 8, 9, 10
Paper revisions	16	0.64	2, 3, 4, 5, 6, 7, 8, 9, 10
Clinical cases seminars	5	0.2	2, 3, 4, 5, 6, 7, 8, 9, 10
Study, papers,..	130	5.2	1, 2, 3, 4, 6, 7, 8, 9
Scheduled tutorials	4	0.16	2, 3, 4, 5, 6, 7, 8, 9, 10
Non-scheduled tutorials	3	0.12	2, 3, 4, 5, 6, 7, 8, 9, 10
Practical seminars	14	0.56	2, 3, 4, 5, 7, 8, 9, 10

The module's global mark is the arithmetic mean of all subjects' marks within the module.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Paper writing	18 %	1	0.04	2, 3, 4, 5, 6, 7, 8, 9, 10
Oral paper presentations	18 %	1	0.04	2, 3, 4, 5, 6, 7, 8, 9, 10
Exams	24 %	1.5	0.06	2, 3, 4, 5, 6, 7, 8, 9, 10
Attendance and active participation	40 %	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Each subject that composes the module is evaluated independently, and the module's global mark is the

arithmetic mean of all subjects' marks within the module. You must have attended at least 80% of the sessions.

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.

Any irregularity in an assessment activity -academic misconduct, plagiarism, or improper use of AI, unless such use is expressly authorised in the course guide- that may lead to a significant change in the mark shall result in that assessment activity being awarded a mark of 0. If the course guide establishes that obtaining a minimum mark in that assessment activity is an essential requirement for passing the course, or if several irregularities occur in the assessment activities of the same course, the final mark for that course shall be 0. In addition, disciplinary proceedings may be initiated against any student who commits any of these irregularities.

Bibliography

Core bibliography

Brunton LL, Knollmann BC, editors. *Goodman & Gilman's: The Pharmacological Basis of Therapeutics*. 14th ed. New York: McGraw Hill; 2022.

Public publisher record: https://www.mheducation.com/highered/mhp/product/goodman-gilman-s-pharmacological-basis-therapeutics-14t

Ritter JM, Flower RJ, Henderson G, Loke YK, MacEwan DJ, Robinson E, et al. *Rang & Dale's Pharmacology*. 10th ed. Edinburgh: Elsevier; 2023.

Public publisher record: https://shop.elsevier.com/books/rang-and-dales-pharmacology/ritter/978-0-323-87395-6

Vanderah TW, editor. *Katzung's Basic & Clinical Pharmacology*. 16th ed. New York: McGraw Hill; 2024.

Public publisher record: https://www.mheducation.com/highered/mhp/product/katzung-s-basic-clinical-pharmacology-16th-edition.html

Golan DE, Loscalzo J, Namchuk MN. *Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy*. 5th ed. Philadelphia: Wolters Kluwer; 2025.

Public publisher record: https://www.lww.co.uk/9781975220341/principles-of-pharmacology/

Flórez J, Armijo JA, Mediavilla Á, editors. *Farmacología humana*. 6th ed. Barcelona: Elsevier Masson; 2014.

Public publisher record: https://shop.elsevier.com/books/farmacologia-humana/florez-beledo/978-84-458-2316-3

Biopharmaceutics, pharmacokinetics and pharmacodynamics

Derendorf H, Schmidt S. *Rowland and Tozer's Clinical Pharmacokinetics and Pharmacodynamics: Concepts and Applications*. 5th ed. Philadelphia: Wolters Kluwer; 2019.

Public publisher record: https://shop.lww.com/Rowland-and-Tozer-s-Clinical-Pharmacokinetics-and-Pharmacodynamics--Concepts-and-A

Doménech Berrozpe J, Martínez Lanao J, Peraire Guitart C, editors. *Tratado general de biofarmacia y farmacocinética*. Madrid: Síntesis; 2013. 2 vols.

Open bibliographic record: https://worldcat.org/oclc/892194781

Pharmacoepidemiology, drug safety and pharmacovigilance

Strom BL, Kimmel SE, Hennessy S, editors. *Textbook of Pharmacoepidemiology*. 3rd ed. Hoboken, NJ: Wiley-Blackwell; 2021.

Public publisher record: https://www.wiley.com/en-us/Textbook%2Bof%2BPharmacoepidemiology%2C%2B3rd%2BEdition-p-978111970

Jose J, Cox AR, Paudyal V, editors. *Principles and Practice of Pharmacovigilance and Drug Safety*. Cham: Springer; 2024.

Public publisher record: https://link.springer.com/book/10.1007/978-3-031-51089-2

European Medicines Agency. *Good Pharmacovigilance Practices (GVP)* [Internet]. Amsterdam: European Medicines Agency; [cited 2026 Jun 30].

Available from: https://www.ema.europa.eu/en/human-regulatory-overview/post-authorisation/pharmacovigilance-post-authorisat

Advanced supplementary readings: quantitative pharmacodynamics, receptors and GPCRs

Kenakin TP. *A Pharmacology Primer: Techniques for More Effective and Strategic Drug Discovery*. 6th ed. London: Academic Press; 2022.

Public publisher record: https://shop.elsevier.com/books/a-pharmacology-primer/kenakin/978-0-323-99289-3

Leff P. The two-state model of receptor activation. *Trends Pharmacol Sci*. 1995;16(3):89-97. doi:10.1016/S0165-6147(00)88989-0.

PubMed record: https://pubmed.ncbi.nlm.nih.gov/7540781/

Giraldo J, Vivas NM, Vila E, Badia A. Assessing the (a)symmetry of concentration-effect curves: empirical versus mechanistic models. *Pharmacol Ther*. 2002;95(1):21-45. doi:10.1016/S0163-7258(02)00223-1.

PubMed record: https://pubmed.ncbi.nlm.nih.gov/12163126/

Rovira X, Pin JP, Giraldo J. The asymmetric/symmetric activation of GPCR dimers as a possible mechanistic rationale for multiple signalling pathways. *Trends Pharmacol Sci*. 2010;31(1):15-21. doi:10.1016/j.tips.2009.10.008.

PubMed record: https://pubmed.ncbi.nlm.nih.gov/19963287/

Roche D, Gil D, Giraldo J. Mechanistic analysis of the function of agonists and allosteric modulators: reconciling two-state and operational models. *Br J Pharmacol*. 2013;169(6):1189-1202. doi:10.1111/bph.12231.

Open full text at PMC: https://pmc.ncbi.nlm.nih.gov/articles/PMC3831701/

Giraldo J. Modeling cooperativity effects in dimeric G protein-coupled receptors. *Prog Mol Biol Transl Sci*. 2013;115:349-373. doi:10.1016/B978-0-12-394587-7.00008-7.

PubMed record: https://pubmed.ncbi.nlm.nih.gov/23415098/

Software

no need of specific software

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TEm) Theory (master)	101	Catalan/Spanish	first semester	afternoon
(PAULm) Classroom practices (master)	101	Catalan/Spanish	first semester	afternoon
(PLABm) Practical laboratories (master)	101	Catalan/Spanish	first semester	afternoon
(SCCm) Clinical case seminars (master)	101	Catalan/Spanish	first semester	afternoon