1. OVERVIEW

Subject Area	General Pharmacology and Therapeutic Procedures
Degree	Bachelor's Degree in Medicine
School/Faculty	School of Biomedical and Health Sciences
Ac. Year	Third
ECTS	11
Type	Compulsory
Language(s)	Spanish
Delivery Mode	On campus
Semester	Yearly

2. INTRODUCTION

General Pharmacology and Therapeutic Procedures is part of the Diagnostic and Therapeutic Procedures module. This subject area is taught over the course of the third year of the Degree in Medicine.

The general aim of this subject is to understand how drugs work in the body as well as pharmacokinetics, pharmacodynamics, adverse reactions, indications, and interactions between medicines of the main pharmacological groups. We will also study the main principles of the different therapeutic procedures.
This subject is supported by others taught in the third year of the Degree in Medicine: General Microbiology (part of the Diagnostic and Therapeutic Procedures module), and Semiology and General Pathophysiology (part of the Human Clinical Training module). General Pharmacology and Therapeutic Procedures is also connected to the fifth-year subject – Therapeutic Medicine (part of the Human Clinical Training module).

3. SKILLS AND LEARNING OUTCOMES

Basic Skills (CB, as per the Spanish acronym):

- CB1: Students will demonstrate their knowledge and understanding of a study area that builds on general secondary school education, and will usually be at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.
- CB5: Students will develop the learning capacity required to undertake subsequent study with a high degree of autonomy.

General skills (CG, by the acronym in Spanish):

- CG12 (B12) Scientific principles of medicine: Students understand the principles of action, indications and effectiveness of therapeutic interventions, based on the available scientific evidence.
- CG18: (C18) Indicates the most suitable therapy for the most common acute and chronic processes, including patients in the terminal phase.

Cross-curricular skills (CT, by the acronym in Spanish):

- CT10: Independent learning: the ability to govern your own development by choosing the most effective lines of action, strategies, tools and opportunities to independently learn and apply knowledge to practice.

Specific skills (CE, by the acronym in Spanish):

- CE51 (4.1; 4.2; 4.3; 4.5; 4.6; 4.13): Be aware of the main groups of drugs, dosage, administration routes and pharmacokinetics. Interactions and adverse effects. Prescription and pharmacovigilance. Pharmacology of the different systems and apparatus. Analgesics, antineoplastics, antimicrobials and anti-inflammatory drugs.
- CE53 (4.8): Nutrition and dietotherapy.
- CE57 (4.10): Transfusions and transplants.
- CE58 (4.11): Understand the basics and indications of radiotherapy.
- CE59 (4.12): Understand the principles of rehabilitation, promotion of personal independence, functional adaptation to the environment, and other physical aspects of morbidity to improve patient quality of life.
- CE63 (4.1; 4.2; 4.3; 4.5; 4.6): Be able to systematically read a radiological image. Know how to use the different drugs correctly. Know how to perform and interpret an electrocardiogram and electroencephalogram.
- CE64 (4.4): Write medical prescriptions, adapted to the circumstances of each patient and legal requirements.
- CE65 (4.9): Evaluate the nutritional state of the patient and provide a suitable diet for different circumstances.

Learning outcomes (RA, by the acronym in Spanish):

- RA1 (4.1): Understand the general principles of pharmacology, pharmacokinetics and pharmacodynamics.
- RA2 (4.2): Be aware of the main groups of drugs, dosage, and administration routes.
- RA3 (4.3): Understand the main interactions and adverse effects of drugs.
- RA4 (4.4): Write medical prescriptions, adapted to the circumstances of each patient and legal requirements.
- RA5 (4.5): Study the pharmacology of the different systems and apparatus.
- RA6 (4.6): Study the pharmacology of analgesics, antineoplastics, antimicrobials, anti-inflammatory, anaesthetics, and other pharmacological groups.
- RA7 (4.7): Understand the general principles of fluid therapy and its use in clinical practice.
- RA8 (4.8): Understand the fundamentals of human nutrition and dietotherapy.
- RA9 (4.9): Evaluate the nutritional state of the patient and provide a suitable diet for different circumstances.
- RA10 (4.10): Understand the general principles of haemotherapy.
- RA11 (4.11): Understand the general principles of radiotherapy.
- RA12 (4.12): Understand the principles of rehabilitation, promotion of personal independence, functional adaptation to the environment, and other physical aspects of morbidity to improve patient quality of life.
- RA13 (4.13): Know how to draw up a treatment order.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CG12 (CB12), CE51 (CE1), CE63, CT10	RA1: Understand the general principles of pharmacology, pharmacokinetics and pharmacodynamics.
CG12 (CB12), CG18 (C18), CE51 (CE2), CE63, CT10	RA2: Be aware of the main groups of drugs, dosage, and administration routes.
CG12 (CB12), CG18 (C18), CE51 (CE3), CE63, CT10	RA3: Understand the main interactions and adverse effects of drugs.
CE64 (CE4)	RA4: Write medical prescriptions, adapted to the circumstances of each patient and legal requirements.
CG12 (CB12), CG18 (C18), CE51 (CE5), CE63, CT10	RA5: Study the pharmacology of the different systems and apparatus.
CG12 (CB12), CG18 (C18), CE51(CE6), CE 63, CT10	RA6: Study the pharmacology of analgesics, antineoplastics, antimicrobials, anti-inflammatory, anaesthetics, and other pharmacological groups.
CG12 (CB12), CG18 (C18), CE51 (CE7), CE63, CT10	RA7: Understand the general principles of fluid therapy and its use in clinical practice.
CG12 (CB12), CG18 (C18), CE53 (CE8), CT10	RA8: Understand the fundamentals of human nutrition and dietotherapy.
CG12 (CB12), CG18 (C18), CE65 (CE9), CT10	RA9: Evaluate the nutritional state of the patient and provide a suitable diet for different circumstances.
CG12 (CB12), CG18 (C18), CE57 (CE10), CT10	RA10: Understand the general principles of haemotherapy.
CG12 (CB12), CG18 (C18), CE58 (CE11), CT10	RA11: Understand the general principles of radiotherapy.
CG12 (CB12), CG18 (C18), CE59 (CE12), CT10	RA12: Understand the principles of rehabilitation, promotion of personal independence, functional adaptation to the environment, and other physical aspects of morbidity to improve patient quality of life.
CG12 (CB12), CG18 (C18), CE51(CE13), CT10	RA13: Know how to draw up a treatment order.

4. CONTENTS

This subject area is divided into 11 learning units, which are then divided into 47 topics:

LEARNING UNIT 1: General Pharmacology

Topic 1: Concepts of pharmacology. Current division of pharmacology. Historical development.

Topic 2. The development of drugs. Preclinical and clinical periods. Clinical trials. Medicinal product use studies. Pharmacoeconomic studies.

Topic 3. Pharmacodynamics. Mechanisms of drug action. Drug-receptor interactions.

Topic 4. Production mechanism of adverse reactions to drugs. Types of adverse reactions. Pharmacovigilance.

Topic 5. Pharmacokinetics I: Administration routes. Absorption. Distribution.

Topic 6. Pharmacokinetics II: Metabolism. Elimination.
Topic 7. Pharmacokinetics III: Clinical pharmacokinetics. Personalisation of treatment. Use of drugs in special circumstances. Monitoring drugs.
Topic 8. Medical interactions. Production mechanisms. Interactions with greater clinical relevance.

LEARNING UNIT 2: Pharmacology of the Autonomic and Peripheral Nervous System
Topic 9. Pharmacology of the autonomic nervous system I: Drugs which modify the sympathetic activity. Adrenergic agonists. Adrenergic antagonists.
Topic 10. Pharmacology of the autonomic nervous system II: Drugs which modify the cholinergic transmission. Cholinergic agonists. Cholinergic antagonists.
Topic 11. Neuromuscular junction blockers.
Topic 12. Local anaesthetics.

LEARNING UNIT 3: Pharmacology of the Circulatory System
Topic 13. Pharmacology of heart failure.
Topic 14. Blood pressure drugs.
Topic 15. Drugs used in ischaemic heart disease.
Topic 16. Antiarrhythmic drugs.
Topic 17. Pharmacology of haemostasis, coagulation and fibrinolysis.

LEARNING UNIT 4: Pharmacology of the Respiratory System
Topic 18. Pharmacology of bronchial asthma.

LEARNING UNIT 5: Pharmacology of the Digestive System
Topic 19. Pharmacology of gastric acid secretion. Anti-ulcer drugs.
Topic 20. Pharmacology of the digestive system motility. Antiemetics.

LEARNING UNIT 6: Pharmacology of inflammation and immunity
Topic 21. Analgesics/antipyretics and non steroidal anti-inflammatory drugs. Anti-arthritics and biological therapies in inflammatory and autoimmune diseases.
Topic 22. Cell-derived inflammatory mediators. Histamine. Antihistamine drugs. Serotonin. Pharmacology of migraine.

LEARNING UNIT 7: Pharmacology of the Central Nervous System
Topic 23. Opioid analgesics.
Topic 24. Anxiolytics and hypnotic drugs.
Topic 25. Anti-epileptic drugs.
Topic 26. Neuroleptic drugs.
Topic 27. Antidepressants.
Topic 28. General anaesthetic drugs.
Topic 29. Pharmacology of Parkinson's. Pharmacology of dementia.

LEARNING UNIT 8: Pharmacology of the endocrine–metabolic system
Topic 30. Steroidal hormones: hormonal contraceptives and corticosteroids.
Topic 31. Thyroid hormones and antithyroid drugs.
Topic 32. Pharmacology of diabetes. Insulin. Oral hypoglycaemic and non-insulin drugs.
Topic 33. Lipid-lowering drugs. Pharmacology of gout.
Topic 34. Pharmacology of osteoporosis. Bisphosphonates.

LEARNING UNIT 9: Antineoplastic pharmacology
Topic 35. Antineoplastic chemotherapy.

LEARNING UNIT 10: Pharmacology of infectious diseases.
Topic 36. General principles of anti-infective drug use. Antiseptics and disinfectants.
Topic 37. Beta-lactam antibiotics.
Topic 38. Aminoglycoside antibiotics.
Topic 39. Glycopeptide antibiotics. Daptomycin. Linezolid.
Topic 40. Macrolide antibiotics. Lincosamides.
Topic 41. Other antibiotics: Tetracyclines. Metronidazole.
Topic 42. Quinolones and sulphonamides.
Topic 43. Anti-tuberculous drugs.
Topic 44. Antiviral drugs.
Topic 45. Antifungal drugs.
Topic 46. Antiparasitic drugs.

LEARNING UNIT 11: Therapeutic procedures
Topic 47: Introduction to therapeutic procedures in medicine.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

- Case study method
- Problem-based learning
- Specialised seminars.
- Theory classes.
- Practical workshops: Practical sessions in the classroom.
- Practical skills classes and simulation environments

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
Theory/practical learning activities on-campus	126 h
Directed learning activities	19 h
Independent working	90 h
Tutorials	36 h
Knowledge tests	4h
TOTAL	**275 h**

7. ASSESSMENT

The assessment methods, plus their weighting in the final grade for the subject area, are as follows:

On campus:

Assessment system		Weighting
Cognitive objectives assessment	Knowledge tests	70%
Assessment of clinical skills	Clinical Cases	15%
Skills assessment	Portfolio of activities	5%
	Simulation activities	5%
Attitude assessment	Attitude	5%

On the Virtual Campus, when you open the subject area, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

8. BIBLIOGRAPHY

The reference work for monitoring the subject is:

- Flórez, J. Farmacología Humana. 6ª ed. Ed. Elsevier, 2014

Recommended bibliography is indicated below:

- Rang, H.P. Rang y Dale, Farmacología + Student Consult. 9ª ed. Ed. Elsevier España, 2020
- Golan, D.E., Tashkian, Asmen H., Armstrong, Ehrin J. et al. Principios de Farmacología. Bases Fisiopatológicas del Tratamiento Farmacológico. 4ª ed. Ed. Lippincott. Williams & Wilkins, 2017
- Lorenzo/Moreno/Leza/Lizasoain/Moro/Portolés. Velázquez. Farmacología Básica y Clínica. 19ª ed. Ed. Médica Panamericana, 2017

Other reference bibliography:

- Lorenzo/Moreno/Leza/Lizasoain/Moro/Portolés. Velázquez. Manual de Farmacología Básica y Clínica. 1ª ed. Ed. Médica Panamericana, 2012
- Brenner y Stevens (Editores). Farmacología Básica. 5ª ed. Ed. Elsevier, 2019
- Lüllman/Mohr/Hein. Farmacología. Texto y atlas. 6ªed. Ed. Panamericana, 2010
- Brunton & Chabner. Goodman & Gilman. Las Bases Farmacológicas de la Terapéutica. 12ª ed. Ed. McGraw Hill, 2011
- Medimecum 2023: Guía de Terapia Farmacológica. Springer Healthcare 2023
- Página Web de la Agencia Española del Medicamento y Productos Sanitarios. Disponible en: www.aemps.gob.es
- Página Web de la Agencia Europea del Medicamento. Disponible en: www.ema.europa.eu

For the resolution of clinical cases and portfolio of activities, specific bibliography may be provided.