Course guide
370031 - FARMACO - Pharmacology

Last modified: 24/07/2025

Unit in charge: Terrassa School of Optics and Optometry
Teaching unit: 731 - OO - Department of Optics and Optometry.

Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2020). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Clot Silla, Eduardo

Others: Rovira Gay, Cristina

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE07. (ENG) The ability to understand and manage basic laboratory materials and techniques.
CE15. (ENG) Adquirir habilitats de treball en equip com unitat en la que s'estructuren de forma uni o multidisciplinar els professionals i demés personal relacionats amb la salut visual.

CE16. (ENG) Adquirir la capacitat per exercir la professió amb respecte a l'autonomia del pacient, a les seves creences, cultura, determinants genètics, demogràfics i socioeconòmics, aplicant els principis de justícia social i comprenent les implicacions ètiques en un context mundial en transformació.

CE18. Describe and apply the procedures and indications of clinical examination methods and complementary diagnostic techniques. Demonstrate knowledge of current eye surgery techniques and develop the capacity to carry out eye tests, including during pre- and postoperative examinations. Identify and apply new technologies in the field of optometric clinical practice.
CE19. Demonstrate knowledge of the forms of presentation and general administration routes of drugs. Demonstrate knowledge of the general principles of pharmacokinetics and pharmacodynamics. Demonstrate knowledge of pharmacological actions, collateral effects and drug interactions. Demonstrate knowledge of topical eye preparations, with a focus on the use of drugs that facilitate visual and optometric examination. Demonstrate knowledge of the most common systemic adverse effects after the application of topical eye medication.

Generical:
CG3. Advise and guide patients and relatives during the entire treatment.
CG4. Critically reflect on the clinical, scientific, ethical and social issues involved in the professional practice of optometry, understand the scientific foundations of optics and optometry and critically evaluate terminology, clinical trials and research methods related to optics and optometry.
CG9. Expand and update one’s professional abilities through continuing education.
CG10. Communicate treatment indications of visual health and their conclusions to the patient, relatives and other professionals involved in the patient’s care, adapting to the sociocultural characteristics of each person.
CG11. Locate new information and interpret it in context.

CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG14. Demonstrate knowledge, skills and abilities in patient healthcare.
CG15. (ENG) Demostrar capacitat per actuar com a agent d'atenció primària visual.

CG16. Participate effectively in both single-discipline and multidisciplinary work groups on projects related to optometry.

CG17. (ENG) Incorporar els principis ètics i legals de la professió a la pràctica professional, respectant l'autonomia del pacient, els seus determinants genètics, demogràfics, culturals i socioeconòmics, integrant els aspectes socials i comunitaris en la presa de decisions, aplicant els principis de justícia social en la pràctica professional, en un context mundial en transformació.

CG18. (ENG) Adquirir la capacitat per a realitzar una gestió clínica centrada en el pacient, el l'economia de la salut i en l´ús eficient dels recursos sanitaris, així com la gestió eficaç de la documentació clínica amb especial atenció a la confidencialitat.

Transversal:
CT3. Teamwork. To be able to work as a member of a multidisciplinary team, either as a base member or undertaking managerial decisions aiming at developing projects from a practical and responsible standpoint, adopting commitments given the available resources
CT5. Efficient use of informacion resources. To manage data and technical and scientific information adquisition, organization, analysis and visualization and to provide a critical appraisal of the results of this management
CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

TEACHING METHODOLOGY

Middle group classes will consist of:
MD1 - Participatory expository class of theoretical and practical content.
MD2 - Active methodologies in the classroom (project-based learning (PBL), case studies, role-playing games, cooperative learning...).
These classes will mainly be intended for theory classes. Students will find on the Atenea platform
the corresponding information, which will consist of the programming and presentations of each unit.
Small group classes will consist of:
MD3 - Practical resolution class, with the participation of students, of practical cases and/or exercises related to
the contents of the subject.
MD4 - Laboratory practices.
MD5 - Reading didactic material, texts and articles related to the contents of the subject.
MD6 - Realization of problems, exercises and assignments, and resolution of doubts through the Atenea virtual campus.
The small group sessions will be divided into laboratory practices and problem sessions and active student learning and the
students
Students will find the practice scripts on the Atenea platform, and they will need to bring them printed to the session
laboratory and that they have already read them. These scripts will be given to the teacher once the practice session with
the results obtained during the experiment.
For the problem sessions, students will have problem statements that will need to be solved before the
scheduled sessions.
Attendance at practical classes in small groups (laboratory or problems) is mandatory.
Description of tasks in independent learning hours.
Students must dedicate the hours of independent learning to the study of the contents, to individual realization
of the proposed problems and the completion of self-assessment tests available at Atenea.
The teaching staff will leave the necessary material in Atenea, which will be the means of communication used to communicate the variations on it
development of the subject. In order to keep track of the subject, it is therefore necessary to consult Atenea often.

LEARNING OBJECTIVES OF THE SUBJECT

Upon completion of the subject Eye Pharmacology, the student must be able to:
- Interpret pharmacokinetic, pharmacodynamic and toxicological data of drugs used in the prevention and treatment of eye conditions, diagnostic tests and visual examinations.
- Recognize and characterize the different pharmaceutical forms and routes of administration of medicines used in the prevention and treatment of eye conditions, diagnostic tests and visual examinations.
- Discriminate the route of administration according to the therapeutic objective
- Describe, justify and apply the clinical criteria governing the rational use of medicines used in the prevention and treatment of eye conditions, diagnostic tests and visual examinations
- Apply the necessary clinical procedures to detect an ocular adverse reaction early
- Establish lines of action in the face of an adverse eye reaction.
- Describe and apply the basic rules of patient care.

STUDY LOAD

Type	Hours	Percentage
Self study	60,0	50.00
Hours medium group	45,0	37.50
Hours small group	15,0	12.50

Total learning time: 120 h

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

CONTENTS

3. Pharmacological Basis

Description:
Introduction to pharmacology
Basic pharmacological terminology
Legal aspects relating to the use of drugs
General principles of pharmacodynamics
General principles of pharmacokinetics
Ocular pharmacokintetics
This topic covers:
Basic concepts relating to ocular pharmacology

Specific objectives:
For students to acquire basic knowledge of pharmacological science

Related activities:
Practicals related to the topic are carried out. Each practical has its practical notebook that is assessed as part of the final mark for the subject.

Related competencies :
CE15. (ENG) Adquirir habilitats de treball en equip com unitat en la que s'estructuren de forma uni o multidisciplinar els professionals i demés personal relacionats amb la salut visual.

CE16. (ENG) Adquirir la capacitat per exercir la professió amb respecte a l'autonomia del pacient, a les seves creences, cultura, determinants genètics, demogràfics i socioeconòmics, aplicant els principis de justícia social i comprenent les implicacions ètiques en un context mundial en transformació.

CE19. Demonstrate knowledge of the forms of presentation and general administration routes of drugs. Demonstrate knowledge of the general principles of pharmacokinetics and pharmacodynamics. Demonstrate knowledge of pharmacological actions, collateral effects and drug interactions. Demonstrate knowledge of topical eye preparations, with a focus on the use of drugs that facilitate visual and optometric examination. Demonstrate knowledge of the most common systemic adverse effects after the application of topical eye medication.
CG17. (ENG) Incorporar els principis ètics i legals de la professió a la pràctica professional, respectant l'autonomia del pacient, els seus determinants genètics, demogràfics, culturals i socioeconòmics, integrant els aspectes socials i comunitaris en la presa de decisions, aplicant els principis de justícia social en la pràctica professional, en un context mundial en transformació.

CG9. Expand and update one’s professional abilities through continuing education.
CG10. Communicate treatment indications of visual health and their conclusions to the patient, relatives and other professionals involved in the patient’s care, adapting to the sociocultural characteristics of each person.
CG16. Participate effectively in both single-discipline and multidisciplinary work groups on projects related to optometry.

CG14. Demonstrate knowledge, skills and abilities in patient healthcare.
CG11. Locate new information and interpret it in context.

CG15. (ENG) Demostrar capacitat per actuar com a agent d'atenció primària visual.

CG18. (ENG) Adquirir la capacitat per a realitzar una gestió clínica centrada en el pacient, el l'economia de la salut i en l´ús eficient dels recursos sanitaris, així com la gestió eficaç de la documentació clínica amb especial atenció a la confidencialitat.

CT3. Teamwork. To be able to work as a member of a multidisciplinary team, either as a base member or undertaking managerial decisions aiming at developing projects from a practical and responsible standpoint, adopting commitments given the available resources
CT5. Efficient use of informacion resources. To manage data and technical and scientific information adquisition, organization, analysis and visualization and to provide a critical appraisal of the results of this management

Full-or-part-time: 0h 45m
Theory classes: 0h 04m
Practical classes: 0h 41m

2. Drugs for diagnosis and exploration

Description:
Local anaesthetics
Dyes for diagnosis
Miotics, mydriatics and cycloplegics
Pharmacology for neural and ocular diagnosis

Specific objectives:
For students to acquire knowledge of basic aspects relating to the mechanism of action, posology, administration route, indications and adverse reactions of the pharmacological groups that are involved in the detection and diagnosis of eye disorders

Related activities:
Practicals related to the topic are carried out. Each practical has its practical notebook that is assessed as part of the final mark for the subject.

Related competencies :
CE18. Describe and apply the procedures and indications of clinical examination methods and complementary diagnostic techniques. Demonstrate knowledge of current eye surgery techniques and develop the capacity to carry out eye tests, including during pre- and postoperative examinations. Identify and apply new technologies in the field of optometric clinical practice.
CE19. Demonstrate knowledge of the forms of presentation and general administration routes of drugs. Demonstrate knowledge of the general principles of pharmacokinetics and pharmacodynamics. Demonstrate knowledge of pharmacological actions, collateral effects and drug interactions. Demonstrate knowledge of topical eye preparations, with a focus on the use of drugs that facilitate visual and optometric examination. Demonstrate knowledge of the most common systemic adverse effects after the application of topical eye medication.
CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 0h 14m
Theory classes: 0h 10m
Practical classes: 0h 04m

3. Ocular pharmacotherapy

Description:
Antiglaucoma
Anti-inflammatory
Anti-allergic
Anti-infectious
Anti-oedema
Viscoelastic
Anti-angiogenic
Botulinum toxin

Specific objectives:
For students to acquire knowledge of basic aspects relating to the mechanism of action, posology, administration route, indications and adverse reactions of pharmacological groups that are indicated in the treatment of the most common eye pathologies, basic clinical procedures and assessment of refractive state.

Related activities:
Practicals related to the topic are carried out. Each practical has its practical notebook that is assessed as part of the final mark for the subject.

Related competencies :
CE19. Demonstrate knowledge of the forms of presentation and general administration routes of drugs. Demonstrate knowledge of the general principles of pharmacokinetics and pharmacodynamics. Demonstrate knowledge of pharmacological actions, collateral effects and drug interactions. Demonstrate knowledge of topical eye preparations, with a focus on the use of drugs that facilitate visual and optometric examination. Demonstrate knowledge of the most common systemic adverse effects after the application of topical eye medication.
CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.

Full-or-part-time: 1h 42m
Theory classes: 1h 17m
Practical classes: 0h 25m

ACTIVITIES

1. Laboratory practices

Description:
Practices aimed at the applied teaching of different concepts related to medicines, their pharmaceutical forms, main characteristics and applications.

Specific objectives:
At the end of the practices the student must be able to:
Practice 1. Medications and forms of administration
Know the information on the packaging of medicines, the different units of concentration, dosage, types of pharmaceutical forms and concept of expiration. Routes of administration and rules of correct administration.

Practice 2. Characteristics of ocular preparations
Know the concept of sterility, become familiar with sterilization systems such as sterilizing filters, the concept of particulate matter and relevance in eye preparations, adequate pH ranges in eye application preparations and concepts of isotonicity.

Practice 3. Bibliographic search for information
Know the different sources of information in health sciences in general and in pharmacology in particular.
Know the best ways to search for clinically relevant information.
Critical reading of scientific information.

Practice 4: Artificial tears I

Know the anatomy and physiology related to the lacrimal functional unit.
Know the composition, physiology and circulation of the tear film.
Know the different concepts related to dry eye syndrome: definition, prevalence, etiology, signs and symptoms, classification, diagnosis, risk factors and treatment.
Familiarize yourself with artificial tear products: composition, available pharmaceutical forms, administration and effects of these preparations.

Practice 5. artificial tear II
Familiarize with the concepts related to the characteristics of artificial tears: surface tension, viscosity, preservatives, tear osmolarity, classification of different types of artificial tears, resolution of clinical cases.

Practice 6. Solutions for cleaning and maintaining contact lenses
Identify the active ingredients of a maintenance solution according to its indications
Describe the basic processes of maintaining a contact lens as well as the active ingredients involved
Assign an individual maintenance system
Remember the main disinfectants used in maintenance solutions
Establish the difference between a disinfectant and a preservative
Describe the mechanisms of action of cleaners, disinfectants and humectants
Establish the differences between cleaners
Establish the differences between moisturizers, conditioners, and contact lens lubricants.

Practice 7. Pharmacovigilance
Understand the concept of pharmacovigilance.
Know the system of notification and analysis of imputability of adverse reactions.

Material:
The material for the laboratory practices will be provided at the beginning of each one. It is necessary to complete the notebook of each practice and this will be evaluated as part of the final note of the subject.

Delivery:
It is essential to deliver the laboratory notebook completed to be evaluated. The delivery deadlines will be indicated at the beginning of the teaching of the subject.

Related competencies :
CE18. Describe and apply the procedures and indications of clinical examination methods and complementary diagnostic techniques. Demonstrate knowledge of current eye surgery techniques and develop the capacity to carry out eye tests, including during pre- and postoperative examinations. Identify and apply new technologies in the field of optometric clinical practice.
CE07. (ENG) The ability to understand and manage basic laboratory materials and techniques.
CE15. (ENG) Adquirir habilitats de treball en equip com unitat en la que s'estructuren de forma uni o multidisciplinar els professionals i demés personal relacionats amb la salut visual.

CE16. (ENG) Adquirir la capacitat per exercir la professió amb respecte a l'autonomia del pacient, a les seves creences, cultura, determinants genètics, demogràfics i socioeconòmics, aplicant els principis de justícia social i comprenent les implicacions ètiques en un context mundial en transformació.

CE19. Demonstrate knowledge of the forms of presentation and general administration routes of drugs. Demonstrate knowledge of the general principles of pharmacokinetics and pharmacodynamics. Demonstrate knowledge of pharmacological actions, collateral effects and drug interactions. Demonstrate knowledge of topical eye preparations, with a focus on the use of drugs that facilitate visual and optometric examination. Demonstrate knowledge of the most common systemic adverse effects after the application of topical eye medication.
CG16. Participate effectively in both single-discipline and multidisciplinary work groups on projects related to optometry.

CG13. Demonstrate and interpret methods for critical analysis and theory development and apply them to the field of optometry.
CG14. Demonstrate knowledge, skills and abilities in patient healthcare.
CG3. Advise and guide patients and relatives during the entire treatment.
CG10. Communicate treatment indications of visual health and their conclusions to the patient, relatives and other professionals involved in the patient’s care, adapting to the sociocultural characteristics of each person.
CG9. Expand and update one’s professional abilities through continuing education.
CG15. (ENG) Demostrar capacitat per actuar com a agent d'atenció primària visual.

CG11. Locate new information and interpret it in context.

CG17. (ENG) Incorporar els principis ètics i legals de la professió a la pràctica professional, respectant l'autonomia del pacient, els seus determinants genètics, demogràfics, culturals i socioeconòmics, integrant els aspectes socials i comunitaris en la presa de decisions, aplicant els principis de justícia social en la pràctica professional, en un context mundial en transformació.

CG18. (ENG) Adquirir la capacitat per a realitzar una gestió clínica centrada en el pacient, el l'economia de la salut i en l´ús eficient dels recursos sanitaris, així com la gestió eficaç de la documentació clínica amb especial atenció a la confidencialitat.

CG4. Critically reflect on the clinical, scientific, ethical and social issues involved in the professional practice of optometry, understand the scientific foundations of optics and optometry and critically evaluate terminology, clinical trials and research methods related to optics and optometry.
CT5. Efficient use of informacion resources. To manage data and technical and scientific information adquisition, organization, analysis and visualization and to provide a critical appraisal of the results of this management
CT6. Independent learning. Identify and overcome gaps in one's knowledge by thinking critically and choosing the best approach to extending one's knowledge.
CT4. (ENG) Teamwork. The ability to work as a member of an interdisciplinary team, as just another member or in a leadership role, who can contribute to developing projects pragmatically and with a sense of responsibility and make commitments that take into account the resources that are available.

Full-or-part-time: 90h
Self study: 90h

2. Abstract

Description:
Writing the abstract, of no more than 350 words, corresponding to the body of a scientific article on ocular pharmacology that will be provided to students.

Specific objectives:
Learn methodologies for selecting and synthesizing the most relevant information in a scientific paper.

Material:
Scientific article available on the ATENEA platform

Delivery:
At the beginning of the teaching of the subject will indicate the term of delivery of the abstract.

Full-or-part-time: 1h
Theory classes: 1h

EUROPEAN DIPLOMA IN OPTOMETRY COMPETENCES

Description:
This module contributes to the European Diploma in Optometry competencies indicated in the following link:
https://drive.google.com/drive/folders/1bwmHBsvkrGnY63DfXAnWZB_i0I2pXa-I?usp=drive_link

GRADING SYSTEM

he final grade of the course will be made by the following sum:
40% of the arithmetic mean of the grades of the three theoretical exams performed +
40% of the arithmetic mean of the qualifications of the practices carried out +
20% of the qualification of the writing work of the abstract

If a re-evaluation is necessary, a single test (100% of the re-evaluatikn mark) will be carried out with the same characteristics as the theoretical exams described.

EXAMINATION RULES.

In no case can any form or notes be available in the learning controls, tests or exams.
The theoretical exams will consist of 70 test-type questions of 3 options each with a penalty in case of incorrect answer, with only one valid option, along with 3 short reasoning questions. The test part and each of the short reasoning questions will be scored on 10 points and the final mark of the exam will result from the arithmetic mean of the four grades.
In case of partial or total copying in any of the evaluations of the subject, what is provided for in the academic regulations for undergraduate and master's studies of the UPC will apply: "Irregular actions that can lead to a significant variation in the qualification of one or more students constitute a fraudulent performance of an evaluation act. This action entails the descriptive qualification of suspension and a numerical grade of 0 for the evaluation act and for the subject, without prejudice to the disciplinary process that may arise as a result of the acts carried out. If the student considers the decision to be incorrect, they can file a complaint with the director or the dean of the teaching center and, if the answer does not satisfy them, they can file an appeal with the rector. The total or partial reproduction of academic or research works, or their use for any other purpose, must have the explicit authorization of the authors. It is up to the director or the dean of the teaching center to resolve allegations about aspects not included in the regulations.".

BIBLIOGRAPHY

Basic:
- Ritter, James M. [et al.]. Rang y Dale farmacología. 9ª edición. Barcelona: Elsevier, 2020. ISBN 9788491135586.
- Mauger, Thomas, F.; Craig, Elson L. Mosby's ocular drug handbook. St. Louis (Missouri): Mosby, 1996. ISBN 081516908.
- Page, Clive P. [et al.]. Farmacología integrada. Madrid [etc.]: Harcourt Brace, cop. 1998. ISBN 8481743402.
- Bartlett, Jimmy D.; Jaanus, Siret D. Clinical ocular pharmacology [on line]. 5th ed. St. Louis, Missouri: Butterworth-Heinemann, cop. 2008 [Consultation: 20/02/2023]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/book/9780750675765/clinical-ocular-pharmacology. ISBN 9780750675765.
- Bowling, Brad. Kanski, oftalmología clínica: un enfoque sistemático. 8ª edición. Barcelona: Elsevier, cop. 2016. ISBN 9788491130031.
- Spalton, David J. [et al.]. Atlas de oftalmología clínica. 3ª ed. Barcelona [etc.]: Elsevier, cop. 2006. ISBN 8481748749.

Complementary:
- Flórez, Jesús. Farmacología humana. 6ª edición. Barcelona [etc.]: Elsevier Masson, 2014. ISBN 9788445823163.
- Lüllmann, Heinz; Mohr, Klaus; Hein, Lutz. Farmacología: texto y atlas. 6a edición. Madrid: Médica Panamericana, cop. 2010. ISBN 9788498352177.
- Raffa, Robert B. Netter: farmacología ilustrada. Elsevier-Masson, 2009. ISBN 9788445819012.
- Baños i Díez, Josep Eladi; March Pujol, Marian. Farmacología ocular [on line]. 2ª edición. Barcelona: Edicions UPC, 2002 [Consultation: 20/02/2023]. Available on: http://hdl.handle.net/2099.3/36690. ISBN 8483016478.
- Sweetman, Sean C. Martindale: guía completa de consulta farmacoterapéutica. 2a ed. Barcelona [etc.]: Pharma, 2006. ISBN 8495993171.

RESOURCES

Other resources:
Baños, J.E et al. Farmacología ocular [en línia]. Ediciones UPC.
Disponible en: https://discovery.upc.edu/iii/encore/record/C__Rb1227510?lang=cat