Course guide
370006 - ANATOSV - Visual System Anatomy

Last modified: 20/03/2024

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: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: ANNA BOZZANO
MAR CARRIÓ LLACH

Others: LAURA DYSON
MÒNICA MARRO

PRIOR SKILLS

The knowledge acquired in the subject of Anatomy and Histology of the Head, taught in the first semester of the Degree in Optics and Optometry,
They will be the essential basis for understanding the anatomical characteristics of vision and its annexes.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE02. Determine the functions of systems in the human body. Demonstrate knowledge of the principles and foundations of the biological processes involved in the normal functioning of the visual system. Recognise, with macroscopic and microscopic methods, the morphology and structure of the tissues, organs and systems in the human body. Demonstrate knowledge of and describe, macroscopically and microscopically, the structures that make up the visual system and ocular adnexa. Demonstrate knowledge of the structure of the cell, embryonic development and organogenesis. Describe the development of the visual system. Demonstrate knowledge of the microorganisms involved in visual system disorders. Demonstrate knowledge of the properties and functions of the various parts that make up the visual system.
CE07. (ENG) The ability to understand and manage basic laboratory materials and techniques.

Generical:
CG11. Locate new information and interpret it in context.

Transversal:
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

TEACHING METHODOLOGY

MD1 - Participatory lecture on theory and problems.
MD3 - Practical problem-solving class requiring student participation in exercises on topics related to the subject matter.
MD6 - Completing problems, exercises and assignments, and resolving doubts via the ATENEA virtual campus.
MD7 - Tutorials.
In order to be able to participate in the laboratory practicals, students must first hand in the completed script (independent learning).
In order to benefit from the course, students must follow the indications that will appear on the ATENEA virtual campus.

LEARNING OBJECTIVES OF THE SUBJECT

1. To understand basic anatomical concepts.
4. To understand, macroscopically and microscopically, the structures that make up the visual system and ocular adnexa.

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	10.00
Hours medium group	45,0	30.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

1. INTRODUCTION

Description:
1. Basic concepts related to the organisation of the visual system.
- Basic anatomical terminology.
- Eyeball axes and parameters.
- Anatomical location and characteristics of the adnexa, the eyeball and the visual pathway.

Specific objectives:
To become aware of the importance of understanding basic anatomical and histological concepts to be able to properly apply them to structures in the visual system.

Related activities:
Laboratory session 1 (introduction to the visual system) will be graded individually after each session.

Full-or-part-time: 150h
Theory classes: 45h
Laboratory classes: 15h
Self study : 90h

2. OCULAR ADNEXA

Description:
1. Anatomical and histological structure of the ocular adnexa.
2. Eyelids.
3. Conjunctiva.
4. Tears and the lacrimal apparatus.
5. Oculomotor muscles.
6. Innervation of the ocular adnexa.
7. Vascularisation of the ocular adnexa.

Specific objectives:
- To anatomically and histologically locate, identify and describe the ocular adnexa.
- To list and define the structures of the vascular and nervous system related to the ocular adnexa.
- To become aware of the importance of the concepts acquired so as to be able to understand that any abnormality, whether in the histology or anatomy of the ocular adnexa, can affect their proper functioning.

Related activities:
Laboratory sessions 2-4 will be completed in groups of 2-3 students but will be individually graded after each session.

Full-or-part-time: 67h 30m
Practical classes: 21h
Laboratory classes: 6h
Self study : 40h 30m

3. THE EYEBALL AND VISUAL PATHWAY

Description:
Anatomical and histological characteristics of the visual organ in humans and the visual pathways.
8. Outer layer (cornea, sclera and sclerocorneal limbus).
9. Middle layer (choroid, ciliary body, iris).
10. Intraocular structures (lens, chambers and humours).
11. Inner layer (retina).
12. Visual pathway (optic nerve, optic chiasma, optic tract, extrageniculate pathway and geniculate pathway).
13. Vascularisation and innervation of the eyeball.

Specific objectives:
- To anatomically and histologically locate, identify and describe the different intraocular structures and layers that make up the human eye.
- To list and define the structures of the vascular and nervous system related to the eyeball.
- To understand and describe, macroscopically and microscopically, the structures that make up the visual pathways.
- To become aware of the importance of the concepts acquired so as to be able to understand that any abnormality, whether in the histology or anatomy of the visual organ, can affect its proper functioning.

Related activities:
Laboratory sessions 5-7 will be completed in groups of 2-3 students but will be individually graded after each session.

Full-or-part-time: 67h 30m
Practical classes: 21h
Laboratory classes: 6h
Self study : 40h 30m

ACTIVITIES

THEORY EXAMS

Description:
Individual in-class exam.
Completion of three exercises (VF exam with penalisations for incorrect answers) related to the topics seen in the subject areas that will cover all of the course's general learning objectives. This will demonstrate students' ability to make use of information resources (cross-disciplinary competency).
Exam results will make up 60% (P1+P2=30% + P3=30%) of students' final marks in the course.
The specific, generic and cross-disciplinary competencies will be considered to have been achieved if a student receives a final mark of 5 or greater.

Specific objectives:
To demonstrate the ability to apply the anatomical and histological knowledge of the head and face that was acquired in lectures.

Material:
Teaching material available on ATENEA.
Recommended reading list.

Full-or-part-time: 3h
Practical classes: 3h

INTRODUCTION AND OCULAR ADNEXA LABORATORY

Description:
Laboratory sessions 1-4 are related to introductory concepts and the ocular adnexa, which will be previously covered in the theoretical part of the course.
Students will complete the 2-hour sessions in groups of 2-3, using histological preparations, slides and/or anatomical models.
As independent learning and to facilitate attaining the proposed objectives, students have available to them on ATENEA the script that must be filled in before coming to the session.
To finish, students will be graded on an individual exam, the results of which will be used to calculate their final marks in the course.

Specific objectives:
To reinforce and integrate the knowledge previously acquired in the theoretical part of the course regarding the ocular adnexa.

Material:
AVAILABLE ON ATENEA
- Detailed script of the session with questions. Students must fill in the question sheet before the laboratory session.
- Set of images of the ocular adnexa.

AVAILABLE IN THE LABORATORY
- Histological preparations.
- Slides with anatomical and histological images.
- Anatomical models.
- Histological and anatomical atlases of the visual organ.

Delivery:
Students must hand in the previously completed script at the beginning of each session.

Full-or-part-time: 20h
Laboratory classes: 8h
Self study: 12h

EYEBALL LABORATORY

Description:
Laboratory sessions 5-6 are related to the anatomical and histological structure of the eyeball previously covered in the theoretical part of the course. Students will complete the 2-hour sessions in groups of 2-3, using histological preparations, slides and/or anatomical models. As independent learning and to facilitate attaining the proposed objectives, students have available to them on ATENEA the script that must be filled in before coming to the session. To finish, students will be graded on an individual exam, the results of which will be used to calculate their final marks in the course.

Specific objectives:
To reinforce and integrate the knowledge previously acquired in the theoretical part of the course regarding the eyeball.

Material:
AVAILABLE ON ATENEA
Detailed script of the session with questions. Students must fill in the question sheet before the laboratory session.
Set of images of the ocular adnexa.
AVAILABLE IN THE LABORATORY
Histological preparations.
Slides with anatomical and histological images.
Anatomical models.
Histological and anatomical atlases of the visual organ.

Delivery:
Students must hand in the previously completed script at the beginning of each session.

Full-or-part-time: 15h
Laboratory classes: 6h
Self study: 9h

LABORATORY EXAMS

Description:
Laboratory exam (individual).
Solving questions and images related to the topics covered during the seven laboratory sessions.
The average of the marks received on the seven exams will account for 20% of final marks in the course.

Specific objectives:
To assess the knowledge gained during the laboratory sessions.

Material:
Script and images available on ATENEA.
Equipment available in the laboratory.

Full-or-part-time: 3h 30m
Laboratory classes: 3h 30m

Problem based learning

Description:
Two problem-based learning activities will be carried out, where different objectives of the course will be worked on in an integrated way. Students will work in groups of 5-6 members under the guidance of the teacher to analyse and investigate a real case and thus acquire some of the knowledge and skills of the course. This activity will be assessed through an oral presentation and participation in the PBL sessions. The PBL mark will count for 20% of the final mark (PBL1=10% + PBL2=10%).

Specific objectives:
Contextualise and integrate the theoretical knowledge of the course

Material:
PBL scenarios, guidelines for carrying out the work and bibliography recommended to Atenea.

Delivery:
Two deliveries, one for each PBL

Full-or-part-time: 30h
Theory classes: 30h

EUROPEAN DIPLOMA COMPETENCIES

Description:
The course in Visual System Anatomy contributes fully or partially to Competency 8. Refractive error. Knowledge, which is worked on in Topic 1. Knowledge of the anatomical structure of the eye and its functions, with a weight of 6 ECTS credits.

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

GRADING SYSTEM

There will be three exams on theoretical knowledge: T1, T2 and T3 (60%).
Theory exam T1+T2 (VF exam with penalisations for incorrect answers: 30%).
Theory exam T3 (VF exam with penalisations for incorrect answers: 30%).
There will be six exams on practical laboratory knowledge: L (20%).
Laboratory exams L1 to L7 (recognising the anatomical structures of the visual system: 3,33% each).
Problem Based Learning: PA (20%).
Final mark = $0.3 \cdot (T1 + T2) + 0.3 \cdot T2 + 0.2 \cdot L + 0.2 \cdot PBL$

Students who fail the subject with a mark greater than or equal to 3 have the option to pass it by taking a resit examination. This resit examination will be conducted under the conditions established by the Academic Regulations for Bachelor's and Master's Degrees at the UPC (NAGRAMA) and the specific conditions established by the Terrassa School of Optics and Optometry. It consists of an exam on all of the topics covered throughout the course. Students who pass the resit exam are given a final mark of 5 in the course. Otherwise, they keep the highest mark of the two received previously.

EXAMINATION RULES.

- Attendance at lectures, practicals and PBL is compulsory.
- Attendance at all graded activities is compulsory.
- If any of the graded activities are not completed, students will be given a mark of 0 for the subject.
- If copying (either partial or total) is found to have taken place on any course assessment, that which is stipulated in the Academic Regulations for Bachelor's and Master's Degrees at the UPC will apply:

"Irregular actions potentially leading to a significant variation of the marks obtained by one or more students will be considered a breach of the assessment regulations. Such behaviour will result in a descriptive mark of "Fail" and a numerical mark of 0 for the examination in question and for the subject, without prejudice to any disciplinary proceedings that may result from that behaviour.
If students disagree with this decision, they may file a complaint with the dean or director of the school. If students are not satisfied with the response, they may lodge an appeal with the rector.
The total or partial reproduction of academic and research works, or their use for any other purpose, must have the express permission of the author or authors of the works.
The director or dean of the school makes decisions regarding allegations about any aspects not covered in the regulations."

BIBLIOGRAPHY

Basic:

- Forrester, John V. [et al.]. The eye: basic sciences in practice. 3rd ed. London: Saunders Elsevier, 2008. ISBN 9780702028410.
- Freddo, Thomas F.; Chaum, Edward. Anatomy of the eye and orbit: the clinical essentials [on line]. Philadelphia: Wolters Kluwer Health, 2018 [Consultation: 13/05/2022]. Available on: https://web-p-ebscohost-com.recursos.biblioteca.upc.edu/ehost/ebookviewer/ebook?sid=5398d897-4564-4160-b7ff-1add53a9e9de%40redis&vid=0&format=EK. ISBN 9781469873282.
- Pipe, D. M.; Rapley L. J. Ocular anatomy and histology. 3rd ed. London: The Association of British Dispensing Opticians, 2008. ISBN 0900099224.
- Remington, Lee Ann. Clinical anatomy of the visual system. 3rd ed. Oxford: Butterworth-Heinemann, 2012. ISBN 9781437719260.
- Ansari, Mohammad Wakeel; Nadeem, Ahmed. Atlas of ocular anatomy [on line]. [Basel]: Springer International Publishing, 2016 [Consultation: 13/05/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=4652554. ISBN 9783319427805.
- Wilson-Pauwels, Linda [et al.]. Nervios craneales: en la salud y en la enfermedad. 3rd. Buenos Aires: Médica Panamericana, 2013. ISBN 9786077743811.