

## **26804 - Visual Optics I**

### **Syllabus Information**

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**Academic Year:** 2021/22

**Subject:** 26804 - Visual Optics I

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 297 - Degree in Optics and Optometry

**ECTS:** 12.0

**Year:** 1

**Semester:** Annual

**Subject Type:** Basic Education

**Module:**

### **1. General information**

### **2. Learning goals**

### **3. Assessment (1st and 2nd call)**

### **4. Methodology, learning tasks, syllabus and resources**

#### **4.1. Methodological overview**

The overall objective is to understand the functioning of the human eyeball as an optical imaging instrument, as a first important stage of visual perception, and study the quality of the images obtained with it.

To do this we develop, according to their anatomy, schematic eye models within the paraxial Geometrical Optics.

#### **4.3. Syllabus**

##### **Program**

0. Historical introduction.
1. Basic concepts and laws of geometrical optics.
2. Optical Representation.
3. Paraxial optics: cardinal elements in centered systems.
4. The human eye as an optical instrument.
5. Imaging in thin systems
6. Correspondence equations in centered systems.
7. Schematic eye models.
8. Imaging and refraction of the eye.
9. Retinal image of an emmetropic eye.
10. Accommodation.
11. Spherical ametropy.

12. Optical compensation of spherical ametropia.
13. Eye astigmatism.
14. Visual acuity.
15. Optical systems with flat surfaces.
16. Ray limitation: aperture and field stops.

#### **Practical sessions**

1. Image formation with a positive lens.
2. Formation of image with negative lens.
3. Refraction through a regular astigmatic lens.
4. Compound systems. Characterization of an optically thick lens.
5. Simulation on an eye on a bench and with VOLT.
6. Simulation of real eye with VOLT.
7. Simulation of ametropies and compensations of a reduced eye on an optical bench.
8. Simulation of ametropies with a digital video camera.
9. Compensation of ametropies with a digital video camera.
10. Simulation of the process of accommodation with a digital video camera.

#### **4.4. Course planning and calendar**

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to <https://ciencias.unizar.es/> and moodle website.

#### **4.5. Bibliography and recommended resources**

- |           |                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BB</b> | Aguilar, M. Óptica Fisiológica. Vol. 1 y 2 Universidad Politécnica de Valencia. 1994                                                                                                          |
| <b>BB</b> | Goss, David A.. Introduction to the optics of the eye/ David A. Goss, Roger W. West Boston [etc] : Butterworth-Heine                                                                          |
| <b>BB</b> | Pons Moreno, Alvaro M.. Fundamentos de visión binocular / Álvaro M. Pons Moreno, Francisco M. Martínez Verdú . d'Alacant, Valencia : Universitat de Valencia, 2004                            |
| <b>BB</b> | Romero, A. Curso Introductorio a la Óptica Fisiológica Comares. Grabada. 1996                                                                                                                 |
| <b>BB</b> | Viqueira Pérez, Valentín. Óptica fisiológica : modelo paraxial y compensación óptica del ojo / Valentín Viqueira Pére Martínez Verdú, Dolores de Fez Saiz . Alicante : Universidad, D.L. 2003 |
| <b>BC</b> | Atchison, David A.. Optics of the human eye / David A. Atchison, George Smith. - 1ª ed., reimpr. Oxford [etc.] : Butte 2002                                                                   |
| <b>BC</b> | Tunnacliffe, Alan H.. Introduction to visual optics / Alan H. Tunnacliffe . - 4th ed., repr. Kent : ABDO Colleague, 2004                                                                      |