COURSE DATA

Data Subject	
Code	34284
Name	Physics II. Geometric optics
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Faculty of Physics	1	First term

Subject-matter

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	1 - Physics	Basic Training

Coordination

Name	Department
MARTINEZ CORRAL, MANUEL	280 - Optics and Optometry and Vision Sciences
SAAVEDRA TORTOSA, GENARO	280 - Optics and Optometry and Vision Sciences

SUMMARY

Geometric Optics is a basic subject of the Degree in Optics and Optometry, where the principles on which many subsequent subjects are based are established. The objective of the course is to establish the principles that govern the propagation of light rays in homogeneous media, and their interaction with refracting elements or openings. Based on these principles, the image formation capacity of diopters, different types of lenses and mirrors is analyzed. Optical aberrations are also described, and the influence of apertures on image illumination and the field of view is discussed.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

No prior knowledge of optics. It requires minimal knowledge of calculation and the flat basic geometry.

OUTCOMES

1207 - Degree in Optics and Optometry

- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- To know and to calculate the parameters that characterize the image-forming elements.
- To know the principle of image formation and the properties of optical systems.
- To know the aberrations of optical systems.
- To know and to handle laboratory materials and techniques.

LEARNING OUTCOMES

The student has to acquire the basic knowledge of Geometric Optics that are necessary to successfully address the study of other subjects of the degree as: optometric and optical instruments, Optical Physics, Optics Ophthalmic and Physiological Optics. They have become familiar with the theoretical and practical use of the main optical elements and likewise of optical systems. Have to handle with ease the ray tracing technique through an optical system known as image defects (aberrations, etc.).

DESCRIPTION OF CONTENTS

1. 1. Mathematical preliminary.

2. 2. Refraction in diopters.

3. 3. The thick lens and the thin lens.

4. 4. Coupling of centered optical systems.

5. 5. Mirrors.

6. 6. Limitation of rays.

7. 7. Aberrations.

8. Laboratory practices:

Practice 1: Planoparallel plate and prism
Practice 2: Collimation
Practice 3: Imaging with a thin lens
Practice 4: Imaging with spherical mirror
Practice 5: Cylindrical lenses

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Tutorials	15,00	100
Laboratory practices	15,00	100
Development of group work	5,00	0
Development of individual work	5,00	0
Study and independent work	20,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	30,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Classroom activities

Theoretical and practical classes: classes modality (can be blended or modalities also include non-contact) which impart the theoretical content of the material. It will reinforce the use of visual methodologies, which more clearly exemplify the theoretical and examples to develop. Exercises will develop practical application of theoretical content.

Small Group Theory sessions: sessions are devoted to student group work, with suggested exercises to be analyzed and studied by the group. Interactivity will be sought through group presentations and classroom examples and accounted for continuous assessment.

Practical classes: classes modality to be developed in the theoretical concepts in a practical application in the laboratory. These classes, small group of up to 16 students, will be carried out using many real systems such as virtual labs, which can be developed interactively.

Student Work

- Study of theoretical

- Development of work and issues raised in class

- Individual tutorials

EVALUATION

The evaluation in the first Call will be made taking into account the following notes, all of them normalized to a maximum of 10 points:

[**N1**]: Exam (theory and problems). The theory part will mean 60% of the exam mark and the problem part will mean the remaining 40%.

[**N2**]: Continuous assessment of theory and problems, based on a set of written tests taken during the course. The theory part will mean 60% of this assessment and the problem part will mean the remaining 40%

[**N3]**: Evaluation of the performance of laboratory practices. A practical test will be carried out in the laboratory in the last session.

The final grade (**N**) is obtained as a result of the weighting:

$$N= 0.5N1+0.3N2+0.2N3$$

To pass the course it is necessary to obtain an overall grade of at least N=5.0.

In the second Call only the exam (N1*) is made, while the notes N2 and N3 obtained during the course are preserved. In this case, there are two evaluation modalities.

The first mode (C1) still keeps the continuous evaluation note N2, so that it obeys the weighting:

C1=0.5N1*+0.3N2+0.2N3

The second modality (C2) only conserves the laboratory grade, so that it obeys the weighting:

C2=0.8N1*+0.2N3

The final grade (C) is obtained as the maximum of the previous two: C1 and C2.

Again, to pass the course it is necessary to obtain an overall grade of at least C=5.0.

REFERENCES

Basic

- Diapositivas mostradas en clase

Additional

- Referencia b1: E. Hecht, Óptica (Addison Wesley, Madrid, 2000)
  Referencia b2: J. Casas, Óptica (Librería Pons. Zaragoza, 1994)
  Referencia b3: A.H. Tunnacliffe y J.G. Hirst, Optics (The Association of British Dispensing Opticians, London, 1996)
  Referencia b4: L.S. Pedrotti y F.L. Pedrotti, S.J., Optics and vision (Prentice Hall, New Jersey, 1998)
  Referencia b5: C.J. Zapata i P. Garcia, Manual dÒpticaGeomètrica per al traçatgràfic de raigs (Servei de Política Lingüística de la Univesitat de València, 2011).
  Referencia b6: M. S. Millán, J. Escofet, E. Pérez, Óptica Geométrica, Ariel Ciencia, 2004.