

**COURSE DATA****DATA SUBJECT****Code:** 34284**Name:** Physics II. Geometric optics**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2026-27**STUDY (S)**

Degree	Center	Acad. year	Period
1207 - Degree in Optics and Optometry	Facultat de Física	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1207 - Degree in Optics and Optometry	Physics	BASIC

COORDINATION

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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.



COMPETENCES / LEARNING 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 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.

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.

To know and to calculate the parameters that characterize the image-forming elements.

To know and to handle laboratory materials and techniques.

To know the aberrations of optical systems.

To know the principle of image formation and the properties of optical systems.

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: Imaging with a thin lens

Practice 3: Collimation

Practice 4: Imaging with spherical mirror

Practice 5: Cylindrical lenses

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	15,00
Theory	30,00
Laboratory	15,00
Total hours	60,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	10,00
Independent study and work	20,00
Preparation of lessons	20,00
Preparation for assessment activities	10,00
Resolution of case studies	30,00
Total hours	90,00

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 assessment in the first Call will be made considering the following marks, all normalized to a maximum of 10 points:

E: Written exam, with Theory and Problems. The theory part will mean 60% of the exam mark and the problem part will mean the remaining 40%. The minimum mark to pass this part is 4.0.

CA: Continuous assessment of Theory and Problems, based on a set of tests carried out, in person or online, during the course.

L: Laboratory assessment. Attendance at practical sessions is mandatory. Practical evaluation will be carried out in the laboratory. The minimum mark to pass this part is 4.0.

The final grade (P) of the first call will be the maximum between

$$P1 = 0.6 E + 0.2 CA + 0.2 L$$

And

$$P2 = 0.8 E + 0.2 L.$$



To pass the course it is necessary to obtain the minimum mark in the written exam and in the laboratory, and obtain an overall grade of at least $P=5.0$.

In the second call, the written exam is compulsorily taken, and a laboratory exam is voluntarily taken (if not done, the laboratory mark from the first call is kept). In the second call the grade assigned in the first-call Continuous Assessment is preserved. The equation for the calculation of the final grade is also kept. The evaluation in the second Call will be made by use of the same formulae as in the first call.

REFERENCES

- Material complementario. Diapositivas y apuntes de clase. Tareas y demostraciones depositadas en Aula Virtual. Ejercicios de auto-evaluación en Aula virtual.
- Bibliografía básica.
- E. Hecht, ¿Óptica¿ (Addison Wesley, Madrid, 2000)
- J. Casas, ¿Óptica¿ (Librería Pons. Zaragoza, 1994)
- A.H. Tunnaclyffe y J.G. Hirst, ¿Optics¿ (The Association of British Dispensing Opticians, London, 1996)
- L.S. Pedrotti y F.L. Pedrotti, S.J., ¿Optics and vision¿ (Prentice Hall, New Jersey, 1998)
- C.J. Zapata i P. Garcia, ¿Manual d'Òptica Geomètrica per al traçat gràfic de raigs¿ (Servei de Política Lingüística de la Univesitat de València, 2011).
- M. S. Millán, J. Escofet, E. Pérez, ¿Óptica Geométrica¿, Ariel Ciencia, 2004.