

<b>POLI</b> ESCOLA SUPERIOR TECNOLOGIA GESTÃO <b>TÉCNICO</b> <b>GUARDA</b>	<b>SUBJECT DESCRIPTION</b>	<b>MODELO</b> PED.013.03
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Course	Topographic Engineering					
Subject	Physics					
Academic year	2023/2024	Curricular year	1st	Study period	2nd semester	
Type of subject	Compulsory	Student workload (H)	Total: 168	Contact: 60	ECTS	6
Professor(s)	Paula Amaro Rodrigues					
<input checked="" type="checkbox"/> Area Coordinator <input type="checkbox"/> Head of Department	(select)	Fernando Pires Valente				

## PLANNED SUBJECT DESCRIPTION

### 1. LEARNING OBJECTIVES

Understanding the fundamentals of material point mechanics and geometric optics.

Interpret analyze and solve practical cases involving physical phenomena framed with those contexts.

### 2. PROGRAMME

- Introduction: Physical Quantities, Units and dimensions, SI System; Scientific notation, Notions of vector calculus and integral calculus.
- Kinematics of the material point: quantities fundamental characteristics and their relationship; Characterization of the one-dimensional motion: application to the uniform motion, uniformly accelerated and uniformly delayed; Graphic interpretation. Characterization movement in two dimensions: uniform circular motion and uniformly accelerated; tangential and normal acceleration components Projectile motion.
- Dynamics of the material point: Newton's Laws and and their relation to the movement; Principle of conservation of linear momentum; The angular momentum conservation principle. Principle of conservation of mechanical energy; Kinetic energy theorem.
- Geometric Optics: Principles and fundamentals of geometrical optics; Reflection and refraction of light; characterization of optical systems consisting of mirrors (spherical and flat), diopters (spherical and flat) and lens (concave and convex).

### 3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The interconnection of learning objectives with the proposed contents is ordered in the following ways: the first and second chapters are the foundation and the basic principles of classical mechanics, in a comprehensive perspective, particularly related to the movements and their causes.

The last chapter covers the study of the interaction of light with optical systems, based on the reflection and refraction phenomena

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#### 4. MAIN BIBLIOGRAPHY

- Serway, R. and Jewett, J. Jr., (2013). *Physics for Scientists and Engineers*; Edição: Cengage Learning, INC, janeiro de 2013. ISBN: 9781133954071
- Noronha, A., Deus, J., Peña, T., Pimenta M. and Brogueira, P. (2014). *Introdução à Física (3ª edição)*. Edição; Escolar Editora, novembro de 2014. ISBN: 9789725924402
- Walker, J., 2016; *Fundamentos de Física (9ª edição) - Volume 1 (Mecânica)*; Edição: LTC, junho de 2016, ISBN: 9788521630357
- Alonso, M. and Finn, E. (2012). *Física, Um Curso Universitário*. Edição; Escolar Editora, janeiro de 2012. ISBN: 9789725922965
- Hecht, E. (2002). *Óptica*. Fundação Calouste Gulbenkian, Lisboa
- Amaro, P.; 2023; *Coletânea de Problemas para a UC*; Instituto Politécnico da Guarda.

#### 5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

The methods and teaching techniques to apply during the sessions are lecture, solving problem, simulation and laboratory group work.

Continuous evaluation:

Written tests (75%) and practical project (25%)

Final evaluation:

Written test (100%) or written test (75%) and practical project (25%), both of which will need to be conducted on the proposed dates during the semester.

Students who have obtained final score higher than 16 values may make an oral test to "defend" the obtained score. If they do not intend to make this oral exam the final score is 16 values.

#### 6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

Lectures, moments involving exposure with audiovisual support, theoretical-practical classes with problem-solving and laboratory classes provide the students with the knowledge needed to achieve the proposed objectives.

#### 7. ATTENDANCE

There are no minimum requirements, however attendance is strongly recommended

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## 8. CONTACTS AND OFFICE HOURS

e-mail: paula.amaro@ipg.pt

office # 1

office hours: Thursday: 10:00 – 12:30

16:00 – 17:30

## DATE

15 de março de 2024

## SIGNATURES

Professor

(signature)

Area Coordinator

(signature)