SUBJECT TEACHING GUIDE

G49 - Classical Mechanics and Relativity

Double Degree in Physics and Mathematics
Degree in Physics

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Physics			Type and Year	Compulsory. Year 2 Compulsory. Year 2
Faculty	Faculty of Sciences				
Discipline	Subject Area: Classical Mechanics and Astronomy Central Module				
Course unit title and code	G49 - Classical Mechanics and Relativity				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. FISICA MODERNA
Name of lecturer	ANGEL ALBERTO VALLE GUTIERREZ
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Other lecturers	ANA QUIRCE TEJA PATRICIA DIEGO PALAZUELOS

3.1 LEARNING OUTCOMES
- Identifying the field of application of Classical Mechanics. Solving mechanical problems using Newton's laws and conservation laws. Understanding systems of particles and rigid bodies.
- Understanding and using reference frames. Relating symmetries of a physical system to conservation laws. Understanding special relativity.

4. OBJECTIVES

Solving problems using Newton's and conservation laws.
Understanding and relating appropriate reference frames.
Indentifying and understanding symmetries in a physical system and using adequate conservation laws
Understanding and solving problems in special relativity.
Understanding the mass-energy equivalence.
Understanding the concept of hamiltonian and lagrangian of a phjysical system

6. COURSE ORGANIZATION

	CONTENTS
1	Reference frames and Newton's laws. Concept of an inertial reference frame. Relativity's principle of Galileo. Relative motion. Galileo's transformation. Relative motion. Corioli's theorem. Types of forces. Equation of motion. Energy diagrams.
2	Introduction to Analytical Mechanics. Generalized coordinates. Constraints. Lagrangian and Hamiltonian formulation. Harmonic oscillator. Resonances.
3	Systems of particles. Energy and angular momentum. Virial's theorem. Rigid body. Rotation around one axis. Principal axis. Gyroscopic motion.
4	Special relativity. Lorentz's transformation. Relativistic dynamics. Space-time. Quadrivectors.
5	Optional final exam.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Theoretical and practical exam about the content of part 1.	Written exam	No	Yes	30,00
Theoretical and practical exam about the content of parts 2 and 3.	Written exam	No	Yes	40,00
Theoretical and practical exam about the content of part 4.	Written exam	No	Yes	30,00
An optional final exam can be done to improve the mark or to retake any of controls 1,2 and 3.	Written exam	Yes	Yes	0,00
TOTAL				100,00

Observations

A mark equal or larger than 5 in 10 is required to pass the subject.
An optional final exam can be done to retake one or more controls or to improve the mark.
There will be a final exam in an extraordinary call in february

Observations for part-time students

There is no special evaluation for part-time students. The teacher will try to facilitate follow-up of the subject.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Dinámica clásica. A Fernández-Rañada, 2005, Fondo de Cultura Económica.

Introducción a la Relatividad Especial, J. H. Smith, 1977, Reverté.

Teoría y problemas de mecánica teórica. Murray R. Spiegel, 1976, McGraw-Hill