SUBJECT TEACHING GUIDE

G69 - Astrophysics

Double Degree in Physics and Mathematics
Degree in Physics

Academic year 2017-2018

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Physics			Type and Year	Optional. Year 5 Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Astrophysics Mention in Fundamental Physics				
Course unit title and code	G69 - Astrophysics				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	https://aulavirtual.unican.es/				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. FISICA MODERNA
Name of lecturer	LUIS JULIAN GOICOECHEA SANTAMARIA
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Other lecturers	DIEGO HERRANZ MUÑOZ AIRAM EDUARDO MARCOS CABALLERO

3.1 LEARNING OUTCOMES
- Get a global perspective on the different objects and structures in the Universe, as well as of their time evolution
- Know the observations and properties of stars, and understand the stellar models
- Understand the stages of the stellar evolution and the physical models involved
- Know the star systems (binaries and clusters), the circumstellar environment (disks and planets), the interstellar medium and the Milky Way
- Know the properties, the content and the evolution of galaxies
- Understand the active galactic nuclei and the galaxy clustering
- Understand the foundations of the General Relativity, its experimental tests and its impact in the study of the Universe
- Know and understand the importance of the results about the cosmic microwave background
- Understand the complementarity of observations supporting the Big-Bang theory and the cosmological models

4. OBJECTIVES
Study the properties and composition of stars, galaxies and the Universe as a whole, as well as the physical phenomena occurring at different cosmic scales
Discuss the physical models that account for the structure and evolution of the Universe and its components
Gain familiarity with simulations of stars, galaxies and larger scale structures
Analysis of information in astronomical databases
Perform work supervised by a professor
Present small projects, solutions of problems, analysis of data and/or astrophysics topics
After completing the subject, be able to solve questions and problems with the help of books

6. COURSE ORGANIZATION	
CONTENTS	
1	Stars. Stellar structure and its models
2	Stellar environment and evolution of stars
3	The Milky Way
4	Normal galaxies and galaxies with active nucleus
5	General Relativity: experimental tests and black holes
6	Cosmology: theory, observations and cosmological parameters
7	Early Universe

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Lab Stars-Galaxies - P1: Simulations of stellar structure and evolution	Work	No	Yes	15,00
Lab Stars-Galaxies - P2: Analysis of observations of galaxies	Work	No	Yes	15,00
Work on relativity-cosmology	Work	No	Yes	15,00
Cosmology Lab	Work	No	Yes	15,00
Exam of questions-problems	Written exam	Yes	Yes	40,00
TOTAL				100,00

Observations

To pass the course, students must present reports corresponding to all lab sessions and works. Students who do not pass in June, can take an examination in September. The exam mark would be their final mark. This special exam would consist of a written test (including questions and problems), as well as an analysis of observations, catalogs and/or computer simulations (similar to those made over the second semester)

Observations for part-time students

To pass the subject in June (end of the second semester), students enrolled part-time must carry out every lab session/work. We will try to set a lab schedule that allows the attendance of all students enrolled (full and part time). We will also facilitate learning and follow-up of the subject by part-time students, through the availability of notes, problems, etc. in the virtual classroom

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

"Astrophysics in a Nutshell" D. Maoz, 2016 (second edition), Princeton University Press

“An introduction to Galaxies and Cosmology” Ed. M.H. Jones, R.J.A. Lambourne, 2004, Cambridge University Press

"Principles of Cosmology and Gravitation" M.V. Berry, 1989, Taylor & Francis