

**COURSE DATA****Data Subject**

Code	33392
Name	Cosmology and space exploration
Cycle	Grade
ECTS Credits	4.5
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1308 - Degree in Journalism	Faculty of Philology, Translation and Communication	4	Second term

Subject-matter

Degree	Subject-matter	Character
1308 - Degree in Journalism	12 - Optional subjects	Optional

Coordination

Name	Department
MARTINEZ GARCIA, VICENT JOSEP	16 - Astronomy and Astrophysics

SUMMARY

- Cosmology and space exploration, and more generally, astronomy, are presents in quality media in a daily basis, both in the written media and in the broadcast media, not to mention specialized journals or digital television platforms. For its general interest and its relationship with very general questions affecting the human nature (who are we? where do we come from?), cosmological topics are very actual and are present in the advanced knowledge canon, despite the deficit in cultural foundation of the general public, since science has not been traditionally considered to be part of 'general culture'. Furthermore, the visual beauty of astronomical pictures has a big impact in graphical and audiovisual media.
- Based on these facts, this topic tries to locate astronomy in social context and in the focus of communication and press. First, the course describes the impact of astronomy in the history of ideas and its role in the birth of modern science departing from the Copernican revolution, to follow with modern astronomy, new telescopes, and astrophysics. After putting astronomy in its context, a modern 'cosmography' is presented, that is, a detailed description of the objects of the universe. This is done hierarchically: asteroids, moons, comets, planets, stars, neutron stars, supernovae, black holes, galaxies, galactic jets, and the universe at large scale. To finish, the course will address a general description of cosmology, that is, the study of the universe as a whole: the



formation of the universe is presented, as a description of the Big Bang, to be followed with the history of the Universe and its final fate. Together with these last aspects, the problems and findings of modern cosmology are presented: the cosmic microwave background, cosmic inflation, and dark matter.

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 special scientific or mathematical background is required. The course is designed for student with both a humanistic or a scientific background. For sure, a natural curiosity and a broad general culture are needed to put information in context, and a rational thinking to discern astronomy from astrology and similar topics is welcome.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1308 - Degree in Journalism

- Desarrollo y profundización en las competencias adquiridas mediante las materias de formación básica y obligatoria, de acuerdo con los conocimientos nuevos que se podrán obtener según la elección de las asignaturas optativas.
- Ampliación de conocimientos de ciencia y tecnología en relación con el posible aprovechamiento social del avance cosmológico y espacial y su reflejo en los medios de comunicación, así como habilidad para su tratamiento adecuado.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

- Students should be able to understand the importancen and the context of astronomy news, and to extract the most important and interesting aspects of a press release for the general public. The distinction between 'real' astronomical pictures and artist views or simulations will be mentioned.
- The students should be able to ellaborate their own texts or audiovisual material on the topics derived of the latest astronomical findings, and to interpret the images produced by the scientific community, presenting technological and scientific advancements of an attractive manner for the public.



DESCRIPTION OF CONTENTS

1. Introduction: Astronomy & Society

- o Astronomy and society
- o The scientific process
- o Cost and impact of science
- o Astrology, rationalism, and astronomy

2. Scientific communication and astronomy

- o Scientific marketing
- o What are news in astronomy
- o Scientific communication triangle and press releases

3. From the scientific revolution to modern astrophysics

- o Ancient astronomy
- o The Copernican revolution: from Ptolemaeus to Galilei
- o From the telescope to the 20th Century revolutions and modern astrophysics

4. Light from the skies. Telescopes.

- o Light and waves. Spectral lines.
- o The telescope: from Galilei to the space telescopes

5. The celestial sphere

- o Looking to the sky
- o Celestial motions
- o Coordinates and time
- o Eclipses

6. Space exploration

- o Pioneers
- o The space race
- o The Space Station and space shuttles
- o Future: a new race to the Moon and Mars

**7. Planetary systems**

- o The Solar System: terrestrial and jovian planets
- o Planetary system formation
- o Exoplanets and life in the Universe

8. Stars, pulsars, supernovae, and black holes

- o Stars inside and the Sun
- o Stellar death: dwarves, giants, supernovae, and pulsars
- o Black holes

9. Galaxies

- o Classification
- o Active galaxies: quasars, jets, and supermassive black holes

10. Cosmology: origin, evolution, and the fate of the universe

- o Big Bang
- o History and the end of the Universe
- o Olbers paradox
- o Inflation and the cosmic microwave background
- o The Universe at large scale
- o Dark matter

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	45,00	100
Attendance at events and external activities	10,00	0
Development of individual work	25,00	0
Study and independent work	7,50	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	5,00	0
TOTAL	112,50	



TEACHING METHODOLOGY

Theory:

- The theoretical lectures will follow a frontal presentation format, including a wealth of graphical and audiovisual information. Actual news will be presented, and its informative treatment will be addressed, comparing as well published news with the original press releases produced by scientific organisations.

Practical part:

- Students should elaborate journalistic material of professional level on the topics of cosmology and space exploration.
- Students will have the chance to interview professional astronomers active on the valencian area, as well as 'covering' events related to astronomy to take place in Valencia.
- Furthermore, the students will visit popular science talks on astronomy, as well as the Observatory of the University of Valencia in Aras de los Olmos or popular observations of amateur astronomers of the Burjassot campus of the University of Valencia.

EVALUATION

The evaluation is splitted in four parts:

- A 30% corresponds to an oral or written exam
- A 30% corresponds to at least three written works (or any other kind of journalistic production) about actual topics on the matter of the course, to be presented during the lecture term before its end.
- A 30% corresponds to an oral presentation of no more than 10 minutes in time, to be presented in the classroom to the students and the professor. presentar en clase frente a los compañeros
- The last 10% will be evaluated on the base of attendance and participation at the lectures.

It is necessary to perform and pass the b) part, and to pass the weighted mean (50% of the total) of the four items to pass the course.

Evaluation criteria

Theory

- The general knowledge of the topics addressed in the course will be evaluated. It is not needed to memorize specific details on the astrophysics of the objects of the universe, to learn list of planets, classification of objects, dates or names. It is important to understand the basic processes occurring in the Universe, and the mechanisms which are responsible of the phenomena observed by astronomers. As mentioned above, there is no need to have special knowled in mathematics, physics, or chemistry, a basic general culture like in the general media is enough.



Practical work

- The quality and scientific exactness of journalistic material will be evaluated, as well as its appropriateness to the target public. Interest and easy-reading, 'catchy' tricks such as the use of paradoxes, and scientific correctness will be important criteria in the evaluation.

REFERENCES

Basic

- * Carl Sagan: Cosmos, Planeta (2006), ISBN 9788408043040 (ed. catalana: Cosmos, Universitat de Barcelona (2007), ISBN 9788447531318; ed. inglesa: Cosmos Ballantine Books (1995), ISBN 978-0345331359), también como serie de televisión, dirigida por Adrian Malone y escrita por Carl Sagan, Ann Druyan & Steven Soter, Cosmos: a personal voyage (Cosmos, un viaje personal), KCET <http://science.discovery.com/convergence/cosmos/cosmos.html>
- * Eric Chaisson & Steve McMillan, Astronomy: A Beginner's Guide to the Universe (6th Edition), Benjamin Cummings (2009), ISBN 978-0321605108 (inglés)
- * New Scientist (Space Section), Revista semanal: <http://www.newscientist.com/section/space>
- * NASA: Astronomy Picture of the Day (NASA): <http://apod.nasa.gov>
- * Lars Lindberg Christensen: The Hands-On Guide for Science Communicators: A Step-by-Step Approach to Public Outreach, Springer (2007), ISBN 978-0387263243 (inglés)

Additional

- Stephen Hawking: Historia del tiempo: del Big Bang a los agujeros negros, Crítica (2011), ISBN 9788498921939, (ed. inglesa: A Brief History of Time, Bantam (1998), ISBN 978-0553380163)
International Astronomical Union & UNESCO: International Year of Astronomy 2009, ver <http://astronomy2009.org/>
Vicent Martínez: Marineros que surcan los cielos. La aventura de descubrir el Universo, Universitat de València (2007), ISBN 9788437066530 (ed. catalana, Mariners que solquen el cel, Bromera (2006), ISBN 9788498241013)
Jay M. Pasachoff, Roger Tory Peterson & Wil Tirion: A Field Guide to Stars and Planets (Peterson Field Guide), Houghton Mifflin Harcourt (1999), ISBN 978-0395934319 (inglés)
Pedro Russo (editor): CAPjournal (Communicating Astronomy with the Public), Revista, <http://www.capjournal.org>
Govert Schilling & Lars Lindberg Christensen, Eyes on the Skies, (Libro & DVD), Wiley-VCH (2009), ISBN 978-3-527-40865-8, ver videos en <http://www.eyesontheskies.org>
Steven Weinberg: Los primeros tres minutos del universo, Alianza (2009), ISBN 9788420683942 (ed. inglesa en The First Three Minutes: A Modern View Of The Origin Of The Universe, Basic Books (1993), ISBN 978-0465024377)