Extragalactic astronomy and cosmology - course description

General information

Course name	Extragalactic astronomy and cosmology
Course ID	13.7-WF-FizD-EAC-S17
Faculty	Faculty of Physics and Astronomy
Field of study	Physics
Education profile	academic
Level of studies	Second-cycle studies leading to MS degree
Beginning semester	winter term 2018/2019

Course information

Semester	2
ECTS credits to win	4
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. Dorota Rosińska

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	15	1	-	-	Credit with grade

Aim of the course

Knowledge of the current state of research on the structure and evolution of the Universe.

Prerequisites

Basic knowledge of general relativity. Ability to program and use numerical methods

Scope

- Cosmological Principle (Copernican)
- Fundamental Cosmological Observations
- Components of the Universe: radiation, baryonic matter, dark matter and dark energy
- Evolution of the flat Friedman-Lemaitre models
- The formation of cosmic structures
- The comological parametrs
- CMB
- The evolution of galaxies and the Universe at high redshift
- The hypothesis of cosmic inflation
- Nucleosynthesis
- Active Galactic Nuclei

Teaching methods

Lecture and class

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
A student can perform, taking into account existing knowledge, calculations to solve basic problems and issues in extragalactic astrophysics and cosmology. Students are able to interpret astronomical observations. Can use their knowledge to construct a simple astrophysical research projects. A student understands the need for further training and is able to understand the lectures of specialists in the field of relativistic astrophysics. Can analyze astrophysical problems and formulate questions to have deeper understanding of problems arising in extragalactic astronomy and cosmology.. Can use his knowledge to give a lecture or write an article for general public – popularization of science. Is able to search for information in english literature.		• a discussion • a test • an ongoing monitoring during classes	• Laboratory

Outcome description	Outcome symbols	Methods of verification	The class form
Students can describe the standard cosmological model, Copernican principle and provide observations to justify its validity. They are able to clasify galaxies and explain the differences between them. They can explain methods of determining the rotation curve of the Galaxy, and interpret its shape in the context of the existence and distribution of dark matter. Students know and understand the methods of estimating the age of galaxies. They know the evolution of galaxies, groups of galaxies (in particular the Local Group of Galaxies), the theory of the Big Bang, the thermal history of the Universe and the fundamental cosmological models. They understand the expansion of the universe, the Hubble law, the importance of the cosmological constant and the microwave background radiation. They can describe the process of light elements after the Big Bang and the results of observational measurement of the abundance of light elements and their impact on the cosmological models.		• a discussion • a test	• Laboratory

Assignment conditions

Lecture: Positive passing of final test.
Class: Handing in homework exercises, passing written tests. Positive marks of all activities.
Final grade: weighted average of the lecture test grade and class grade (50% and 50% respectively).

Recommended reading

1] James B. Hartle, Grawitacja, 2009, ISBN 9788323504764.
[2] Barbara Rydel, Introduction to Cosmology, Addison-Wesley; 1st edition (October 18, 2002).

[3] P. Schneider, Extragalactic astronomy and Cosmology, Springer, 2006.
[4] A. Liddle, Wprowadzenie do kosmologii współczesnej, Prószyński i S-ka, 2000.
[5] M. Jaroszyński, Galaktyki i budowa Wszechświata, PWN, 1993.

Further reading

[1] Internet

Notes

Modified by dr hab. Piotr Lubiński, prof. UZ (last modification: 28-06-2018 17:54)