UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Elements of Astrophysics

2021-3-E3001Q054

Aims

The aim of the course is to provide an understanding of the problems related to modern astrophysics with particular reference to stellar and extragalactic astrophysics and cosmology. At the end of the course the student will be able to describe the properties of the most important astrophysical sources both from a theoretical and observational point of view.

Contents

Stellar astrophysics. Compact Objects. Accretion processes and high energy astrophysics. Compact object binaries and gravitational waves. Properties of galaxies and galaxy clusters. Cosmological model.

Detailed program

1. Introduction to basic concepts
2. Outline of stellar structure and evolution
3. Compact objects: white dwarfs, neutron stars and black holes
4. Accretion processes and high energy astrophysics
5. Gravitational waves from compact object binaries
6. Galaxies: morphology and dynamics
7. The cosmic distance ladder and the conceptual tools for its measurement
8. Hubble law and the cosmological model

Prerequisites

Physics 1 (including special relativity), Physics 2 (electromagnetic radiation), Physics 3 (black body radiation, wave-particle duality).

Teaching form

The course is divided into 48 hours of lectures conducted by the teacher in the classroom. During the Covid-19 emergency period lectures will be held remotely with some events streamed live. During the lessons the main theoretical and observational bases of modern astrophysics will be exposed. In addition to lectures, the lecturer is also available to students, during office hours or by appointment scheduled by email, to answer questions and requests for clarification.

Textbook and teaching resource

Dan Maoz: Astrophysics in a nutshell. Ed. Princeton University Press.

Stephan Rosswog & Marcus Brüggen: Introduction to High-Energy Astrophysics. Ed. Cambridge University Press.

Semester

III year, first semester

Assessment method

The final exam consists of a colloquium on the topics discussed during the lectures and during which the student must be able to demonstrate mastery of the different topics. In particular the student will be questioned on two topics selected from a list published on e-learning: the first topic will be selected by the student, the second by the teacher. It is not possible to ask to be questioned on a third topic, but it is possible to reject the grade. Books and notes cannot be used during the oral exam.

Office hours

Friday 15:30 - 17:30 or via appointment.