UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Elements of Astrophysics

2425-3-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. 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
5. Gravitational waves from compact object binaries
6. Galaxies and Active Galactic Nulcei
7. 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 composed of 24 lessons of 2 hours each in frontal-teaching delivery mode and held in person. During the lessons the main theoretical and observational bases of modern astrophysics will be exposed. Lectures will be recorded and posted on e-learning within 24 hours (unless there are problems). In addition to lectures, the lecturer is also available to students, by appointment scheduled via 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 written test aimed at ascertaining mastery of the different topics covered in class.

The written test will consist of five closed questions, two open questions, and an exercise. Each closed answer will be evaluated with a score equal to 1 in case of a correct answer, 0 in case of no answer, -1 in case of a wrong answer. Each open question will be evaluated with a score from 0 to 10. The exercise will be evaluated with a score from 0 to 5.

Books, forms and notes cannot be used during written tests. There are no tests planned during the course.

Following a positive written exam (>=18/30), the student can optionally take an oral exam, or maintain the written grade. The oral exam is assigned a score between -5 (completely insufficient) and +5 (excellent). If the oral exam is taken, the final grade is given by the sum of the written grade and the oral grade. If the overall grade is less than 18, the exam is considered not passed and the written exam must also be repeated. If the final grade is equal to or higher than 33, the "cum laude" is also awarded. If the grade obtained at the oral exam is rejected, then the written exam must also be retaken.

For Erasmus students: it is possible to take the exam in English on request.

Office hours

Via appointment (on line or in person).

Sustainable Development Goals

QUALITY EDUCATION