UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

General Relativity

2425-1-F5802Q025

Aims

This course will allow students to understand:

- the physical and mathematical underpinnings of general relativity;
- black hole physics;
- the foundations of cosmology.

Contents

1. Principles and equations of general relativity.
2. Elements of differential geometry.
3. Black hole physics.
4. Elements of cosmology.

Detailed program

1. Summary of special relativity. Minkowski spacetime.
2. Equivalence principle. Accelerated observers.

3. Elements of differential geometry. Curvature. Geodesics.

4. Physics on curved spaces. Curvature and gravity. Einstein’s equations. Rudiments of Hamiltonian treatment. Vielbein formalism.

5. Gravitational waves. Black holes: Schwarzschild, charged, rotating solutions. Definition of mass in general relativity. Causality.

6. Elements of cosmology. De Sitter and anti-de Sitter spaces.

Prerequisites

Undergraduate degree in physics.

Teaching form

24 2-hour lectures, delivered didactics, in presence. In English.

Textbook and teaching resource

Lecture notes available at https://www.dropbox.com/s/t84lftb2llgb87w/GR.pdf?dl=0P

Semester

First semester

Assessment method

Written exam. Five open questions, five exercises, three hours. Object of evaluation will be the logic used in the resolution of the problems.
It is possible to hold the exam in English.

Office hours

By appointment

Sustainable Development Goals

QUALITY EDUCATION