UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Laboratory of Data Analysis

2122-1-F5802Q001

Aims

Provide core knowledge and skills for planning and conducting a scientific investigation in astrophysics using archival observations and theoretical models.

Contents

Brief introduction on the basic principles of galaxy formation and evolution, learn how to formulate a scientific question, design and conduct a scientific experiment in astrophysics using archival observations, analysis and data mining of observations and theoretical models, how to present results in a science report.

Detailed program

Galaxy formation and evolution: collapse of dark matter, cooling, gas accretion and star formation, feedback

Formulate a science question: pose an interesting and valid question within the context of current theories; refine the science question on the basis of available data

Design and conduct a scientific experiment: testing hypothesis and design tests and experiments that are most relevant to address a science question

Analysis and data mining: how to analyze and handle large datasets, how to quantify a phenomenon and model a process, how to process data to derive higher level quantities

How to write a report: structure and composition of a successful science report

Practicals: mini research projects using archival observational and theoretical data

Prerequisites

Undergraduate degree in physics.

Students particularly interested in a more in depth understanding of how astrophysical data are acquired are encouraged to follow the "Laboratory of data acquisition" offered in the first semester.

Students interested in deepening their understanding of galaxy formation and evolution should also consider the course "Cosmic Structure Formation".

Teaching form

Introductory workshops on elements of galaxy formation and evolution, formulating a valid scientific question, structuring a scientific investigation, report writing. Hands-on sessions to conduct the analysis and mining of archival data.

All activities will be in English.

Textbook and teaching resource

Relevant material will be provided via handouts.

Mo, van den Bosch, White; Galaxy formation and evolution; 2010, Cambridge Press. [Available from the university library also as PDF and e-book]
Feigelson & Babu; Modern Statistical Methods for Astronomy; 2012, Cambridge Press. [Available from the university library also as PDF and e-book]

Semester

Second semester.

Assessment method

Written report and oral exam on the material presented in the report and discussed during the workshops.

Office hours

By appointment (via email).