UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Laboratory of Data Acquisition

2526-1-F5803Q006

Aims

Provide core knowledge and skills for planning and conducting observations of galactic and extragalactic objects using optical telescopes. Provide the core knowledge and skills for the analysis and interpretation of the observations. Handle and analyze data from archives. Gain experience in the use of a telescope.

At the end of the course, students will have acquired:
• Knowledge and understanding in the fields of astrophysics and astronomy
• Familiarity with investigative methods in astrophysics and experimental methodologies
• Mathematical, statistical, and computational tools specific to astrophysics
• The ability to apply the scientific method to astrophysical problems
• The ability to solve complex problems in the field of astrophysics

Contents

How to write a proposal, know-how on optical instrumentations, use of optical telescope (Bicocca Telescope), elements of data acquisition and data reduction, best practice for the analysis of data, query and analyze archival data, how to present results in a scientific report.

Detailed program

Proposal writing: the structure of a successful proposal, scientific and technical elements, planning of observations

Know-how on optical instrumentations: imaging and spectroscopy, site conditions, estimates of integration

times

Use of Bicocca Telescope: practical notions on the instrumentation usage at the telescope site or at the remote control room

Data acquisition and data reduction: from raw to science-grade data, extracting measurements from data and associated errors

Acquisition and analysis of archival data: the structure of databases, how to create and use queries, how to analyze archival data

Data analysis and scientific report: how to model observations and address the goal of the proposal, reporting results

Practicals: mini research projects using data from the Bicocca Telescope

Prerequisites

Undergraduate degree in physics.

This course is recommended to students wishing to follow an observational/experimental track during their studies

Teaching form

Introductory workshops on proposal writing, the characteristics of instruments, data reduction techniques, handling archival data, and planning and execution of observations. Hands-on sessions to conduct observations and data analysis using the Bicocca Telescope.

Teaching methods: introductory presentations (20 percent, frontal teaching) and laboratory work in groups (80 percent, interactive teaching)

All activities will be in English.

Textbook and teaching resource

All necessary material will be provided via handouts.

A usefeul reference is the book:
Mark Gallaway; An Introduction to Observational Astrophysics; 2016, Springer. [Available from the university library also as PDF and e-book]

Semester

First semester.

Assessment method

Written report on the mini-research project undertaken during the laboratory, and oral exam on the material presented in the report and discussed during the workshops. The final assessment evaluates both the theoretical and technical knowledge acquired during the course, and the methodology developed during the module relevant to devising, planning and executing an observational science programme.

The evaluation will include:
•? ?the knowledge of the content of the lectures and the ability to link topics and to solve problems (weight 55%);
•? ?the clarity of the oral exposition, the use of the appropriate technical language, and the ability to formulate and present coherent arguments on the topics of the course (weight 15%);
•? ?the technical skills and data analysis methodologies acquired during the lab sessions (weight 30%).

Office hours

By appointment (via email).

Sustainable Development Goals

QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE