UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

History of Modern Physics and Optical Instrumentation

2223-3-E3002Q039

Aims

1) Knowledge on:

- the historical evolution of optics and optometry

· the main concepts of physical optics from interference and diffraction to quantum theory

- the historical evolution and modern development of the instrumentation used in optics and optometry

2) skills in:

- the use of advanced tools in use in the optics and optometric practice

- the use of statistics for data processing

Contents

The course concerns the history of optics and the concepts of physical optics developed in the last centuries, from the first lenses to spectacles, from the optics of the Seventeenth century to quantum optics, including the evolution of the main instrumentation applied in the field of optics and optometry.

Detailed program

PART 1

Lens of Layard

History of glass

Hystory of spectacles

Leonardo and contact lenses

Alhazen, Rucellai, Mauròlico, Della Porta

PART 2

Galileo, Keplero, and the telescope: optics of the Seventeenth century

Refraction of light: Snell, Cartesio, Fermat

Diffraction: Grimaldi

The measure of the velocity of light: Roemer

Huygens e Newton

Newton and his telescope

PART 3

The optics of the Ninenteenth and Twenteenth centuries: from interference and diffraction of quantum optics

Polarization, interference, diffraction, and scattering of light

Light sources, black body

PART 4

Devices and instrumentation for optics, optometry, and ophthalmology

LABORATORY

Laboratory activities on polarization, diffraction, UV-visible spectroscopy, instrumentation for application in optics and optometry (tonometer, ocular aberrometer, fundus camera, endothelial microscopy, etc.).

Prerequisites

Concepts of mathematics and physics of the first year of the Degree in Optics and optometry

Teaching form

The course includes 4 credits of lectures and 2 laboratory credits. Attendance at laboratory lessons is required.

During the Covid-19 emergency period, lectures and laboratory activities will take place in a mixed way: partial attendance and recorded lessons.

Textbook and teaching resource

- notes on the e-learning page of the University

- F.W. Sears, Ottica, CEA, chapters 7-12

- notes on the laboratory activities on the e-learning page of the University

- recorded lessons provided by the teacher through the University e-learning platform

Semester

first semester

Assessment method

The test consists of a written test and an oral test.

The purpose of the written test is the extensive verification of the preparation on the exam program.

The purpose of the oral exam is to verify the ability to autonomously think and discuss on the topics of the program.

During the semester, four written tests (multiple choice questions, brief exercises, graphic constructions or similar requests) will be proposed, each one part of the program, on dates communicated by the teacher in class and through the e-learning platform.
Alternatively, students will be able to take the written exam on the day of the official exam sessions. The test written on the day of the official appeal will be divided into four parts so that those who have passed only one, two or three partial tests in itinere or in previous appeals can limit themselves to play the part (s) missing. negative result in previous tests.

To access the oral, students will need:

· Be in compliance with the compulsory attendance hours at the laboratory (at most, four hours of absence, including late arrivals or early exits); students who do not attend the minimum of laboratory hours will not be able to take the exam, if not attending the laboratory hours in a subsequent academic year.

· Obtain the sufficiency in the writings of all the four parts of the program (in ongoing committees or during the writings of official appeals).

The oral exam will cover the program of the course.

The exam can be done in English. For the written test, the student must expressly request it to the teacher at least one week in advance of the exam date.

Office hours

by appointment to be agreed via email

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING