



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Storia della Fisica Moderna e degli Strumenti Ottici

1920-3-E3002Q039

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#### 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 optical, optometric and ophthalmic 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

History 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 Nineteenth and Twentieth 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 of the first year of the Degree in Optics and optometry

## Teaching form

- 4 cfu: lectures
- 2 cfu: laboratory activity (attendance during laboratory hours is mandatory)

## 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

## Semester

first semester

## Assessment method

Written exam and oral exam including a written report concerning one specific laboratory activity.

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. During the oral exam a written report presented by the candidate on an experience carried out in the laboratory will also be evaluated.

## **Office hours**

by appointment to be agreed via email

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