UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

History of Optical Instruments

2627-3-E3002Q051

Aims

The objectives fall within the area of "Professional training" and refer to the following Dublin Descriptors:

1 – Knowledge and understanding

- Acquire knowledge of the key stages in the historical development of optics and optometry
- Acquire knowledge of the foundations of physical optics, starting from interference and diffraction introduced in the 19th century up to quantum theory in the early 20th century
- Acquire knowledge of the historical development of the instruments used in the optometric field since the 19th century

2 – Applying knowledge and understanding

- Acquire skills in the use of certain instruments commonly used in optometric practice
- Acquire basic statistical skills for processing experimental data
- Acquire skills in applying the scientific method, which is essential both for understanding the topics covered and for applying them to professional practice
- Acquire the ability to understand the principles of physical optics underlying instruments and devices used in optometric practice, as well as those underlying the visual system

3 – Making judgements

- Develop the ability to reflect independently on the course content in order to acquire autonomous judgement

4 – Communication skills

- Acquire communication skills related to the course content, both in terms of historical aspects and the historical evolution of the field, as well as the concepts of physical optics developed from the 19th century

onwards

5 – Learning skills

- Develop the ability to reflect independently on the course content in order to acquire learning skills with a view to future developments in the field

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. The historical background and the concepts of geometrical and physical optics are complementary. The syllabus also includes the instruments and methods currently used in optometry, as well as a section on a statistical and evidence-based scientific approach.

Detailed program

- **4 ECTS credits:** IN-PERSON LECTURES, with the programme divided into **TWO UNITS** (the contents of each unit are provided in the two respective sections on the course's e-learning page).

- **1 ECTS credit:** ASYNCHRONOUS REMOTE E-LEARNING EXERCISES (the contents are provided on the course's e-learning page in the section "BLENDED (S. Tavazzi): error theory, introduction to statistics, performance metrics for experimental and artificial intelligence methods, evidence-based practice, scientific literature").

- **1 ECTS credit:** MANDATORY IN-PERSON LABORATORY, held either in the laboratory or in the computer rooms (contents and further information are provided on the course's e-learning page in the section "LABORATORY (M. Acciarri, E. Ponzini, J. Saccani): assignments, activity organisation and other materials").

Prerequisites

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

Teaching form

The course corresponds to a total of 6 ECTS credits, of which 4 ECTS credits are devoted to the topics divided into the four parts listed in the detailed syllabus, 1 ECTS credit to e-learning exercises, and 1 ECTS credit to laboratory activities. Attendance at the laboratory activities is compulsory.
More specifically, the course includes the following:
• 32 hours of in-person lectures;
• 12 hours of e-learning exercises;

• 12 hours of in-person interactive laboratory activities, with compulsory attendance.

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

The examination consists of four parts:

(i) **WRITTEN EXAMINATION on the content of the E-LEARNING LECTURES** (multiple-choice questions, short exercises, graphical constructions, or similar tasks);

(ii) **WRITTEN EXAMINATION on UNIT 1 of the LECTURES** (multiple-choice questions, short exercises, graphical constructions, or similar tasks);

(iii) **WRITTEN EXAMINATION on UNIT 2 of the LECTURES** (multiple-choice questions, short exercises, graphical constructions, or similar tasks);

(iv) **ORAL EXAMINATION on UNIT 2 of the LECTURES** (EXCLUDING HISTORICAL CONTENT) **AND on the LABORATORY PART** (open-ended questions). Any absences from the laboratory do not exempt candidates from knowing the topics covered, which are summarised in the laboratory assignments and teaching materials provided by the instructors.

During the semester, **THREE WRITTEN IN-CLASS TESTS** will be offered, on three dates announced by the instructor during class and via the e-learning platform. The three tests will cover the content of sections (i)–(ii)–(iii) of the examination. If a student passes a test, they will not have to take the corresponding written part of the final examination.

Alternatively, students may take the written tests on the dates of the official examination sessions. The written examination held on the official examination date will be divided into three parts, so that students who have passed only one or two partial tests during the semester or in previous examination sessions may take only the missing parts or the parts they previously failed.

To be admitted to the oral examination, students must:

- have completed the required number of mandatory laboratory attendance hours; students who do not

complete the minimum number of laboratory hours will not be allowed to take the examination unless they attend the laboratory hours in a subsequent academic year;
- obtain a passing grade in all three written tests, either during the in-class tests or during the written examinations held in the official examination sessions.

Each of the four examination parts will be graded out of 30. The **FINAL GRADE** will be the average of the four grades obtained, rounded to the nearest whole number. Any honours distinction (*cum laude*) will be awarded by the examination board.

Office hours

by appointment to be agreed via email

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING