PROVISIONAL COURSE SYLLABI FOR THE SECOND-YEAR COURSES STARTING FROM THE ACADEMIC YEAR 2025/26

The detailed syllabi for the first-year courses (first and second years in the case of part-time students) are available at the following page:

https://elearning.unimib.it/course/index.php?categoryid=10978&lang=en

The syllabi for the second-year courses starting from the academic year 2025/26 (third and fourth year in the case of part-time students) are as follows.

OPTICAL PROPERTIES OF MATERIALS

- Transmission and reflection of electromagnetic waves, evanescent waves;
- Characterization and measurement of light polarization states, applications to industrial measurements and photoelasticity;
- Optical anisotropy, dielectric tensor of anisotropic media, propagation of electromagnetic waves in anisotropic media, birefringence, retardation plates, dichroic polarizers;
- Rayleigh scattering, Raman scattering, Mie scattering of electromagnetic radiation;
- Moiré effect and technique; Speckle interferometry;
- Examples of applications of the aforementioned concepts in optics, optometry, ophthalmology.

The evaluation is based on a written exam and an oral exam. The written exam consists of 20 multiple-choice questions (maximum score: 10 points) and one open-ended question on the course material (maximum score: 6 points). The oral exam is based on open-ended questions (maximum score: 14 points). The final grade will be determined by the sum of the three previous scores (minimum final score to pass the exam: 18 out of 30).

INTRODUCTION TO DIGITAL IMAGING AND COMPUTER VISION

- Digital image formation, spatial and intensity sampling;
- Image processing and enhancement:
- Point operators: linear and non-linear;
- Spatial filtering;
- Simple local feature detection: point-based, statistics;
- Image segmentation based on local features;
- Geometry of perspective image formation (including geometric distortions);
- Point-based stereometry: triangulation and stereo-matching, short review of stereo-matching algorithms;
- Examples of applications of the previous concepts in optics, optometry, ophthalmology.

The evaluation of students is based on both a written exam and an oral exam. The written exam consists of 30 multiple-choice questions or short exercises (maximum score: 30 points). The oral exam is based on open-ended questions (maximum score: 30 points). The final grade will be the average of the two previous scores, rounded to the nearest integer (minimum final grade to pass the exam: 18 out of 30).

VIRTUAL AND AUGMENTED REALITY

- Basic concepts characterizing both virtual reality (VR) and augmented reality (AR): contents, hardware, software for the design and implementation of such systems;
- Fundamental principles characterizing VR and AR, with references to design principles, historical aspects, and motivations behind the applications;

- Enabling technologies for VR and AR;
- Overview of the evaluation (usability, benefits, assessment of adverse effects) of VR/AR applications;
- Output devices and vision, input devices and tracking, interaction between virtual worlds;
- Optometric aspects related to the visual system during the use of VR/AR systems.

The evaluation of students is based on both a written exam and an oral exam. The written exam consists of 30 multiple-choice questions or short exercises (maximum score: 30 points). The oral exam is based on open-ended questions (maximum score: 30 points). The final grade will be the average of the two previous scores, rounded to the nearest integer (minimum final grade to pass the exam: 18 out of 30).

VISUAL NEUROSCIENCES
- Cognitive neuroscience and neuropsychology: an introduction;
- Understanding how neural activity results in visual perception;
- Understanding visuo-perceptual disorders in brain-damaged patients;
- Neuropsychological rehabilitation of visuo-perceptual disorders;
- Healthy and pathological decline of brain mechanisms underlying visual perception in the older population.

The evaluation of students is based on an oral exam. Evaluation criteria: the grade is below 18 (not passed) if the knowledge of the course content is insufficient; the grade is between 18 and 23 if the knowledge of the content is sufficient, with the grade depending on critical analysis skills and communication abilities; the grade is between 24 and 27 if the knowledge of the content is good, with the grade depending on critical analysis skills and communication abilities; the grade is between 28 and 30 cum laude if the knowledge of the content is excellent, with the grade depending on critical analysis skills and communication abilities.