

MATERIALS ENGINEERING AND NANOTECHNOLOGY (LM76R)

(Lecce - Università degli Studi)

Teaching PHYSICS OF MATTER MOD. I (Int) PHYSICS OF MATTER MOD. II

GenCod A003096

Owner professor Paola PRETE

Teaching in italian PHYSICS OF MATTER
MOD. I C.I. PHYSICS OF MATTER MOD.

Teaching PHYSICS OF MATTER MOD. I
(Int) PHYSICS OF MATTER MOD. II

SSD code FIS/03

Reference course MATERIALS
ENGINEERING AND

Course type Laurea Magistrale

Credits 12.0

Teaching hours Front activity hours:
108.0

For enrolled in 2025/2026

Taught in 2025/2026

Language ENGLISH

Curriculum Percorso comune

Location Lecce

Semester Second Semester

Exam type Oral

Assessment Final grade

[Open Course timetable](#)

BRIEF COURSE DESCRIPTION

COURSE PROGRAMME

PHYSICS OF MATTER - Mod. I

- Physics of Waves
- Electromagnetic Waves
- Experimental Foundations of Quantum Physics
- Fundamental Principles of Quantum Physics
- Quantum Mechanics
- Hydrogen-like Atoms

PHYSICS OF MATTER – Mod. II

- Many-electron atoms
- X-ray absorption and fluorescence of atoms
- Laboratory I: X-ray fluorescence through electron micro-analysis
- Bonds in molecules
- Introduction to Condensed Matter Physics
- Classical description of electric conduction in metals
- Electrons contribution to thermal and thermo-electric properties of metals
- Quantum theory of electrons in metals
- Elements of crystallography
- X-ray diffraction of crystals
- Experimental methods of X-ray diffraction on crystals
- Laboratory II: X-ray diffraction on crystals

REQUIREMENTS

Knowledge and understanding of the concepts taught in Classical Physics

COURSE AIMS After the Course the student will be able to describe major physical properties of atoms, molecules and solids using the principles and laws of quantum mechanics.

TEACHING METHODOLOGY The Course includes classroom theoretical lectures and practical Laboratory sessions, the latter mainly focussing on the applications of X-ray fluorescence for determining the materials chemical composition and the on X-ray diffraction measurements in the study of crystalline materials.

ASSESSMENT TYPE Physics of Matter – Mod. II is the second modulus of the Course named “Physics of Matter”. There a single final exam which includes the contents of Modulus I and Modulus II.

REFERENCE TEXT BOOKS

- R. Eisberg & R. Resnick, *QUANTUM PHYSICS of Atoms, Molecules, Solids, Nuclei, and Particles*, John Wiley & Sons (1985)
- M. Alonso & E. J. Finn, *Fundamental University Physics, Vol. 3: “Quantum and Statistical Physics”*, Addison-Wesley Publishing (1968)
- N.W. Ashcroft & N.D. Mermin, *Solid State Physics*, Holt-Saunders International Editions (1976)
- C. Kittel, *Introduction to Solid State Physics* (), Thomson Press (2003)