
COURSE: Advanced Physical Chemistry Mod. 1 (Module of Advanced Physical Chemistry)

ACADEMIC YEAR: 2019-2020

TYPE OF EDUCATIONAL ACTIVITY: Characterizing

TEACHER: Antonio Santagata

e-mail: **antonio.santagata@cnr.it**website: scienze.unibas.it/site/home.html

phone: **0971 427227**mobile (optional): **3281691663**

Language: **ITALIAN**

ECTS: (lessons and
tutorials/practice) **5**n. of hours: (lessons and
tutorials/practice) **48**Campus: **Potenza**
Dept./School: **Department of
Science**
Program: **Chemical Sciences
(LM54)**Semester: **II**
From 02/03/2020 up
to 30/06/2020

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The module is based on an introduction to Solid State Physics dealing with some subjects relevant for allowing the students to become familiar with solid state-condensed matter physics and related features and applications. The topics can be summarized in:

- *crystal structure, properties of metals, semiconductors and dielectrics, non-crystalline solids (block 1);*
 - *surface and interface physics and nanostructures (block 2).*
 - *practical demonstrations (block 3)*
-

PRE-REQUIREMENTS

Background from Bachelor Degree in Chemistry (L27)

SYLLABUS

Block 1: periodic array of atoms, fundamental types of lattices, wave diffraction and the reciprocal lattice, crystal binding and elastic constants, phonons, energy bands, plasmons, polaritons, polarons and excitons, properties of amorphous materials (16 hours).

Block 2: surface crystallography, surface electronic structure, heterostructures, nanostructures and electronic transport and optical properties and characterizations (8 hours)

Block 3: imaging techniques (e.g. SEM, TEM, AFM) crystal structure (EDX) and other material characterizations

TEACHING METHODS

Theoretical lessons (24 h), practical demonstrations (24h).

EVALUATION METHODS

Oral examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- *C. KITTEL – INTRODUCTION TO SOLID STATE PHYSICS, JOHN WILEY & SONS, INC. 2005*
 - *P.A. COX – THE ELECTRONIC STRUCTURE AND CHEMISTRY OF SOLIDS, OXFORD 2003*
 - *P.W. ATKINS, J. DE PAULA, PHYSICAL CHEMISTRY, OXFORD UNIVERSITY PRESS 2014.*
 - *LECTURE NOTES.*
-

INTERACTION WITH STUDENTS

Office Hours: on Friday from 15:00 up to 19:00 at the Laser Chemical Physics Laboratory. Other flexible availability is offered emailing, beforehand, the teacher.

EXAMINATION SESSIONS (FORECAST)¹

16/4/2019, 21/5/2019, 18/6/2019, 16/7/2019, 17/9/2019, 15/10/2019, 19/11/2019, 17/12/2019

SEMINARS BY EXTERNAL EXPERTS YES NO **FURTHER INFORMATION**

¹Subject to possible changes: check the web site of the Teacher or the Department/School for updates.