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**COURSE: Advanced Physical Chemistry Mod. 1**

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**ACADEMIC YEAR: 2016-2017**

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**TYPE OF EDUCATIONAL ACTIVITY: Basic**

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**TEACHER: Dr. Antonio Santagata**

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e-mail: **antonio.santagata@cnr.it**

website:

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

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Language: **ITALIAN**

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ECTS: (lessons and  
tutorials/practice) **5**n. of hours: (lessons and  
tutorials/practice) **48**Campus: **Potenza**  
Dept./School: **Dipartimento di  
Scienze**  
Program: **Chemical Sciences  
(LM54)**Semester: **II**  
(06/03/2017,  
15/06/2017)

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**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)*
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**PRE-REQUIREMENTS**

*Background from Bachelor Degree in Chemistry (L27)*

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**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*

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**TEACHING METHODS**

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

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**EVALUATION METHODS**

*Oral examination.*

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**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.*
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**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.*

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

*21/02/2017, 21/03/2017, 12/04/2017, 23/05/2017, 20/06/2017, 18/07/2017, 19/09/2017, 24/10/2017, 21/11/2017, 19/12/2017.*

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

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

