Testi del Syllabus

Resp. Did. **Matricola: null**

Anno offerta:	**2016/2017**
Insegnamento:	**1006832 - NANOPHOTONICS**
Corso di studio:	**5052 - COMMUNICATION ENGINEERING - INGEGNERIA DELLE TELECOMUNICAZIONI**
Anno regolamento:	**2016**
CFU:	**6**
Settore:	**ING-INF/02**
Tipo Attività:	**D - A scelta dello studente**
Anno corso:	**1**
Periodo:	**Secondo Semestre**
Sede:	**PARMA**

Testi in italiano

Lingua insegnamento	Inglese
Contenuti	The course provides an introduction to the newly developing and fascinating area concerned with controlling light at a subwavelength scale. Topics of discussion include: near-field optics, nanoscale quantum emitters, photonic crystals, plasmonics and optical metamaterials. Where necessary, selected elements of related concepts, such as diffraction theory, light-matter interaction, interaction with small structures, and nonlinear optics, are provided too.
Testi di riferimento	• Lukas Novotny and Bert Hecht, Principles of Nano-Optics, Cambridge, 2012 • Stefan Maier, Plasmonics: Fundamentals and Applications, Springer, 2007 • Course slides are available. Further scientific papers will be indicated during the course.
Obiettivi formativi	The objective of the course is to present a basic overview of nanophotonics including the underlying principles and some current trends. The attendees will be able to understand the light-matter interaction at nanoscale as well as the to study new and potential subwavelength applications.
Prerequisiti	Physics: basic knowledge in fields of optics (ray optics, interference and diffraction of light, principle of laser), electrodynamics (Maxwell equations, wave equation, plane wave, waves in optical materials) and semiconductor physics (energy bands, p-n junction). Mathematics: ability to solve simple partial differential equations.
Metodi didattici	The course is taught through lectures explaining the basic principles and theory of the discipline. Exercises are focused on practical topics presented in lectures.
Modalità di verifica dell'apprendimento	Homework (during the first part of the semester 30 %), project report (during the second part of the semester 30 %) and written exam (40 %).

Programma esteso	Roughly 4 hours for each topic 1. Fields and waves in optics 2. Resolution and localization, principles of nanoscale optical microscopy 3. Near-field probes 4. Optical properties of bulk materials 5. Light interaction with small structures 6. Elements of nonlinear optics 7. Quantum emitters 8. Wave propagation in periodic media, photonic crystals, coupled resonators 9. Plasmonics 10. Optical antennas 11. Metamaterials 12. Selected applications

Testi in inglese

Lingua insegnamento	English
Contenuti	The course provides an introduction to the newly developing and fascinating area concerned with controlling light at a subwavelength scale. Topics of discussion include: near-field optics, nanoscale quantum emitters, photonic crystals, plasmonics and optical metamaterials. Where necessary, selected elements of related concepts, such as diffraction theory, light-matter interaction, interaction with small structures, and nonlinear optics, are provided too.
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