

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: Joanna Olesiak-Bańska
DEPARTMENT: Chemical Department
SCIENTIFIC DISCIPLINE: Chemical Sciences

COURSE CARD

Course name in Polish: Seminarium nanofotoniki
Course name in English: Nanophotonics seminar
Course language Polish
University-wide general course type*:
The course is intended for all PhD students: YES / NO

- ~~1) BASIC COURSE~~
- ~~2) SPECIALIST COURSE~~
- 3) SEMINAR
- ~~4) HUMANISTIC COURSE~~
- ~~5) LANGUAGE~~

Subject code: NCQ100115S

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)			15	
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes
Number of ECTS points			0	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. General chemistry
2. Basics of physics and mathematics
3. Basics of spectroscopy

COURSE OBJECTIVES

1. To provide students with a general knowledge on photonics and light-matter interaction
2. To provide students with a knowledge on nanotechnology and advanced materials
3. To provide students with a trends in nanomaterials and photonic materials characterization using spectroscopy and microscopy techniques
4. To provide students with the knowledge on chemistry in nanoscale

PROGRAM CONTENTS

Form of classes – seminar (Sem)	Number of hours
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Sem1	Introduction to nanophotonics.	1
Sem2	Multiphoton spectroscopy and microscopy in nanoscale.	1
Sem3	Photoactive materials and nanomaterials.	1
Sem4	Semiconductor nanomaterials in photonics	1
Sem5	Plasmonic materials in photonics	1
Sem6	Nanomaterials for nonlinear optics	1
Sem7	Methods of characterization of nonlinear optical properties of nanomaterials	1
Sem8	Advanced laser spectroscopy of nanomaterials	1
Sem9	Chirality in the nanoscale	1
Sem10	Metamaterials and nanocomposites	1
Sem11	Photonic crystals	1
Sem12	Organic lasers and nanolasers	1
Sem13	Liquid crystals and self-assembly in nanophotonics	1
Sem14	Application of nanomaterials in biology and medicine	1
Sem15	Biomaterials (DNA, proteins) in nanophotonics	1
	Total hours:	15

TEACHING TOOLS USED
N1. Multimedia presentation N2. Discussions during the seminar N3. Students' presentations

ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	student has a sound knowledge of basic subjects such as mathematics, physics, chemistry or others
Knowledge	P8S_WG	has an advanced knowledge fundamental to a field relevant to his/her research, including the most advanced methods of research and verification of results achieved
Skills	P8S_UW	student has scientific and technological skills relevant to methods and methodology of conducting scientific research and critical evaluation of the results obtained
Skills	P8S_UK	is able to prepare and present an oral and multimedia presentation in English on the implementation of the research and to lead a discussion on the presented presentation.

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PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Paras N. Prasad, Nanophotonics, Wiley-Interscience, 2004
- [2] K. D. Sattler, Handbook of nanophysics, CRC Press, 2011
- [3] B. E. A. Saleh, M. Carl Teich “Fundamentals of Photonics” John Wiley & Sons, Inc. 2007
- [4] R. L. Sutherland, “Handbook of nonlinear optics” Marcel Dekker, Inc. 2003
- [5] L. Novotny B. Hecht, “Principles of Nano-Optics”, Cambridge (2006)
- [6] Research papers in the dedicated journals

SECONDARY LITERATURE:

- [1] Robert Boyd, „Nonlinear Optics 4th Edition” Academic Press 2019
- [2] Eugene Hecht, „Optics 5th Edition” Pearson 2016

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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