

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

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: dr hab Jan Masajada, prof. ucz.

DEPARTMENT: Faculty of Basic Technical Problems W11

SCIENTIFIC DISCIPLINE: Physical Sciences

COURSE CARD

Course name in Polish: Promienie fale i fotony

Course name in English: Rays waves and photons

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: NFQ100053W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30	-	-	-
Grading	Exam			
Number of ECTS points	0			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Introductory course in physics
2. Introductory course in mathematical analysis

COURSE OBJECTIVES

- C1 acquire knowledge in the field of geometrical optics
- C2 acquire knowledge in the field of wave optics
- C3 acquire knowledge in the field of quantum optics

PROGRAM CONTENTS

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Form of classes – lecture (Lec)		Number of hours
Lec1	Introduction to the course, fundamental problems in theoretical description of optical phenomenon	2
Lec2	Introduction to the theory of vision; physical and philosophical issues.	2
Lec3	Fermat principle, geometrical optics, instruments	2
Lec 4	Caustics and limits of the ray theory	2
Lec 5	Huygens – Fresnel principle – introduction to wave theory	2
Lec 6	Diffraction in the far field regime	2
Lec 7	Diffraction in the near field regime	2
Lec 8	Wave theory of image formation	2
Lec 9	Classical and synthetic holography	2
Lec 10	Coherence theory.	2
Lec 11	Superresolution microscopy	2
Lec 12	Special and general theory of relativity	2
Lec 13	Introduction to quantum mechanic	2
Lec 14	The physics of photon	2
Lec 15	Quantum entanglement	2
Total hours:		30

TEACHING TOOLS USED
N1. Lecture with multimedia presentation N2. Literature prepared by author available via internet N3. Individual study and preparation for the exam

ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8U_W	Exam
Skills	P8U_UW	Exam
Skills	P8S_UU	Exam
Social competence	P8S_KK	Exam
Social competence	P8S_KR	Exam
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PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Materiały do wykładów
- [2] K. Gniadek „Optyczne przetwarzanie informacji”, PWN 1992
- [3] W. T. Cathey, Optyczne przetwarzanie informacji i holografia, PWN 1978
- [4] R. K. Luneburg, “Matematyczna teoria optyki”, PWN, 1993
- [5] E. Hecht Optyka, PWN, 2013

SECONDARY LITERATURE:

- [1] Artykuły z czasopism specjalistycznych

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

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