

WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

FACULTY OF ... Fundamental Problems of Technology	
SUBJECT 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: basic course (mathematics, physics, chemistry, other) Departmental course developing professional skills: interdisciplinary course	
Type of course: optional	
Educational effects according to ZW 26/2017: ... P8U_W, P8S_WG, P8U_U, P8S_UK, P8U_K	
Subject code: FTP9852	

*delete as applicable

	Lecture	Laboratory	Seminar
Number of hours of organized classes in University (ZZU)	30		
Number of hours of total student workload (CNPS)	90		
Form of crediting	Exam		
Number of ECTS points	3		
including number of ECTS points for practical (P) classes			
including number of ECTS points for direct teacher-student contact (BK) classes	2		

*delete as applicable **In case of didactic courses also inspections and evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES	
1.	Introductory course in physics
2.	Introductory course in mathematical analysis

SUBJECT 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

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SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01 has knowledge in the field of geometrical optics

PEK_W02 has knowledge in the field of wave optics

PEK_W03 has knowledge in the field of quantum optics

Relating to skills:

PEK_U01 able to choose the proper theoretical tools for solving the problems in optics

PEK_U02 knows how to initiate and lead discussions on optics

Relating to social competences:

PEK_K01 understands the importance of research and teaching

PROGRAM CONTENTS

Form of classes – lecture		Number of hours
Lec 1	Introduction to the course, fundamental problems in theoretical description of optical phenomenon	2
Lec 2	Introduction to the theory of vision; physical and philosophical issues.	2
Lec 3	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

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EVALUATION OF ACHIEVED SUBJECT EDUCATIONAL EFFECTS		
Evaluation: F – forming (partial) C – concluding	Educational effect number	Way of evaluating achievement of educational effects
F1	PEK_W01, PEK_W02, PEK_W03, PEK_U01, PEK_U02, PEK_K01	exam

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] Articles from scientific journals

SUBJECT SUPERVISOR

(NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. Jan Masajadajan.masajada@pwr.edu.pl