

Course title:	Photonics
Course title in Polish:	Fotonika
Course for discipline:	Mechanical engineering

Semester:	5	Status of course:	faculty	Language:	english
Academic year:	2027/28	Catalog number:	159/2025/26		

Coordinator of course:	Andrzej Kaźmierczak
Lecturer od course:	Andrzej Kaźmierczak
Executing unit:	WIP, KPIE
Ordering unit:	Doctoral School SGGW
Assumptions, goals and description of the course:	<p>The main goal of the course is to familiarize the students with a present the state of the art of nowadays photonics and its application in contemporary business and engineering.</p> <p>The course will start with a general introduction to photonics and explanation of a general idea of using light for a data transmission (1h of lecture) as well as fundamental physical phenomena attached to optical signal transmission (1h of lecture). Further the fundamental techniques of photonics will be presented to the students. These will include optoelectronics and free-space photonics (1h of lecture), optical-fiber based photonics (1.5h of lecture) and integrated photonics (1h of lecture). Further the student will be exposed on fundamental photonics applications including: optical telecom and datacom (2h of lecture), sensory (1h of lecture) and quantum technologies (0.5h of lecture). In practical exercises section a fundamental features of optical fibers will be presented to students. Further students will have the opportunity of a hands-on experience on fundamental techniques used in optical fibers including fiber cleaving and splicing and using optical fiber Bragg gratings for mechanical units metrology (4h of practical exercises).</p> <p>The course will be concluded with a colloquium and evaluation of students' reports on practical exercises.</p>
Didactic form, number of hours:	15 hours
Teaching methods:	Lecture with demonstrations and practical exercises
Limit of people in the group:	10

#### Learning outcomes

KNOWLEDGE - the graduate knows and understands:	SKILLS - the graduate is able to:	COMPETENCES - the graduate is ready to:
To the extent enabling to revise the existing pradisgms in the field/discipline - the world achievements, gathering theoretical background as well as general and selected detailed issues	Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline	Critically evaluate the achievements in the field/discipline represented
Major general development trends in the field/discipline	<del>Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline</del>	Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect
<del>To the extent enabling to revise the existing pradisgms in the field/discipline - the world achievements, gathering theoretical background as well as general and selected detailed issues</del>	<del>Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline</del>	Support the ethos of scientific circles and conduct independent research
The method of verification of learning outcomes:	A final grade offered to the student	
Form of documentation of achieved learning outcomes:	Practical exercises reports and colloquium.	
Elements and weights of the final grade:	A final grade for practical exercises reports (1/2) and a final grade of a colloquium (1/2).	
Place of the course:	WIP, KPIE	

#### Basic and supplementary literature

Bogdan Galwas Podstawy telekomunikacji optofalowej 2018 (dostępne bezpłatnie online)

Comments:	
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Estimated number of hours of work of the doctoral student necessary to achieve the assumed learning outcomes:	
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#### Learning outcomes reference to the second degree characteristics of the National Qualification Framework (level 8) covering doctoral competences:

Symbol:	Learning outcomes:	8 level NQF
SD1_KW01	To the extent enabling to revise the existing pradisgms in the field/discipline - the world achievements, gathering theoretical background as well as general and selected detailed issues	P8S_WG
SD1_KW02	Major general development trends in the field/discipline	P8S_WG
SD1_KU05	Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline	P8S_UW
SD1_KK01	Critically evaluate the achievements in the field/discipline represented	P8S_KK
SD1_KK03	Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect	P8S_KK
SD1_KK08	Support the ethos of scientific circles and conduct independent research	P8S_KR