COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optics

Course

Field of study
IT education

Year/Semester
3/5

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
26

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Faculty of Materials Science and Technical Physics

Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of physics within the scope of the lecture in general physics. Basic knowledge of mathematical analysis and algebra in the field of mathematics lectures. The ability to solve mathematical and physical problems with the use of matrix and differential calculus complete. Understanding the necessity of expanding knowledge and acquiring new skills

Course objective

To provide students with basic knowledge about properties, description and calculations operational parameters of simple and complex geometric, wave and laser optics system

Developing the ability to configure simple optical experimental systems andapplication

Developing teamwork skills in students

Course-related learning outcomes

Knowledge

1. Define the basic physical concepts used in the description of optical elements and the system , determine their role in the practical applications of the system, indicate the methods of such selection components of the system and its configuration so that it has the assumed properties consumables. K1_W02,

2. Recognize and name the component modules of different types of lasers, characterize their role and influence on properties of the generated radiation. Describe the differences in the design and parameters of lasers in depending on the type of active center. Name and characterize the basic parameters of the beam K1_W17

Skills

1. Design a simple optical system based on the methods of matrix optics. Describe with Jones matrix state of beam polarization and its changes caused by individual elements K1_U04, K1_U10, K1_U16

2. Test the stability of the laser resonator. Calculate the parameters of the Gaussian beam from parameters of the resonator K1_U16

3. Relate the basic properties of the optical fiber with its geometrical and material characteristics K1_U20

Social competences

1. Actively participate in problem solving. Develop your own knowledge and skills K1_K01

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Effect	Form of evaluation	Assessment criteria education
W01-W02	test,	3 - 50.1% -70.0%;
	activity in the example	4 - 70.1% -90.0%;
		5 - from 90.1%
U01-U3	test	3 -50.1%70.0%;
	activity during lecture	4 - 70.1% -90.0%
		5 - from 90.1%
K01-K02	test	3 - 50.1% -70.0%;
	activity during lecture	4 - 70.1% -90.0%;
		5 - from 90.1%

Programme content

1 Matrix description of the optical system, matrices of basic optical elements and instruments

2. Wave properties of light, the concept of the coherence path and coherence time

3. Optics of anisotropic media, matrix description of light polarization

4. Principle of operation and basic components of lasers

5. Types of lasers and their characteristics

6. Gaussian beam optics

7. Guiding the beam in the optical fiber, types of optical fibers, elements of the optical path

8. Basics of nonlinear optics

9. Applications of lasers in materials technology and medicine

10. Optical information processing and holography

Teaching methods

Lecture: presentation illustrated with examples given on the board

Bibliography

Basic

1. R. Jóźwicki, "Fundamentals of photonic engineering", WNT, Warsaw 2008

2. F. Ratajczyk, "Optics of Anisotropic Centers", Publishing House of the Wroclaw University of Technology,Wroclaw 2005

3. B. Ziętek, "Optoelectronics", Nicolaus Copernicus University Publishing House, Toruń 2004

4. B. Ziętek, "Lasers", Nicolaus Copernicus University Publishing House, Toruń 2008

Additional

1. N. W Karłow, "Lectures on the physics of lasers", WNT Warsaw 1989

2. A. Kujawski, P. Szczepański, "Lasers Physical basics", Publishing House of the Warsaw University of Technology, Warsaw 1999

3. R. Jóźwicki, "Optics of lasers", WNT, Warsaw 1981

4. F. Kaczmarek, "Fundamentals of lasers", WNT Warsaw 1983

5. F. Kaczmarek, "Introduction to the physics of lasers", PWN Warsaw 1978

6. K. Shimoda, "Introduction to the physics of lasers", PWN Warsaw 1993

Breakdown of average student's workload

	Hours	ECTS
Total workload	57	2,0
Classes requiring direct contact with the teacher	35	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	0	0,0

[1] delete or add other activities as appropriate