



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Elements of optronics

Course

Field of study

Mechatronics

Area of study (specialization)

-

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Dawid Kucharski, PhD Eng.

Responsible for the course/lecturer:

Division of Metrology and Measurement
Systems,

Institute of Mechanical Technology,

Faculty of Mechanical Engineering,

Poznan University of Technology,

Jana Pawla II 24 Street,

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Prerequisites

Basic knowledge of mathematics, physics and technics.



Course objective

Getting to know the fundamentals of optoelectronics: laser, interferometric, holographic and fibre techniques. Getting the knowledge about construction, principles of work and exploitation of optoelectronic elements. Getting the ability to work with optoelectronics for different field of use.

Course-related learning outcomes

Knowledge

A student can:

characterize the basics of optical techniques: interferometric, holographic and optical fibres, used in mechatronics. A student can characterize the basic features of the construction, principles of operation and exploitation of optoelectronic components used in mechatronic devices;

define the basic directions of development in the implementation of optoelectronic elements in mechatronic devices.

Skills

A student can critically analysis of the optoelectronic element in the mechatronic device operation.

A student is able to formulate basic principles of safe and correct operation of an optoelectronic device.

A student is able to choose optoelectronic components for selected technical applications.

A student can propose techniques and optoelectronics elements for the optronics development.

Social competences

A student understands a whole life learning necessity; can inspire and organize a learning process of others. A student can collaborate with others and with specialists from other field of science and technology.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Summative assessment:

Lectures: course final exam, written (5 questions)

Laboratory: written/oral answer + lab reports; passing rules: positive assessments for all lab exercises

Programme content

Lectures:

1. Physics of semiconductor lasers, fundamentals of geometrical optics.
2. Wave optics: interference, diffraction, polarization phenomenas of laser light.
3. Fibre technique in mechatronics.
4. Optical and thermal radiation detectors in mechatronics.



5. Fundamentals of optomechatronics.
6. Fundamentals of interferometry and optical spectroscopy in mechatronic applications.

Laboratory:

Lab exercises:

1. Laser beam spatial shaping.
2. Interference phenomena in laser optics.
3. Fiber thermal dilatation coefficient determination.
4. Diffraction phenomena in laser optics.
5. Polarisation phenomena in laser optics.
6. Fiber couplers and light detectors in laser optics.

Teaching methods

1. Lectures: oral presentation with illustrated examples on a blackboard, calculations.
2. Laboratory: lab experiments, tasks solving, discussions.

Bibliography

Basic

1. B. Ziętek, Optoelektronika, Wydawnictwo Uniwersytetu Mikołaja Kopernika, Toruń 2009.
2. Z. Bielecki, K. Rogalski, Detekcja sygnałów optycznych, WNT, Warszawa 200.

Additional

1. K. Booth, S. Hill, Optoelektronika, Wydawnictwo Komunikacji i Łączności, Warszawa 2004.
2. P. Hariharan, Optical Holography; Principles, Techniques and Applications, Cambridge University Press, 2nd edition, Cambridge 2008.
3. Electrooptics, Europa Science Ltd, Cambridge.
4. Nature Photonics (w wersji elektronicznej).



Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) ¹	20	1,0

¹ delete or add other activities as appropriate