COURSE DESCRIPTION CARD - SYLLABUS

Course name
Optical Constructions [S1FT2>KO]

Course

Field of study
Technical Physics

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge of experimental physics and mathematics at the undergraduate engineering course level. Basic knowledge of engineering graphics. Skill in elementary physical problem solving, skill in acquiring information from listed sources, ability to make simple engineering drawing. Understanding the necessity of personal competence development, readiness to cooperation in a team.

Course objective

1. Acquaintance of the students with the basic problems concerning structure, parameters and design process of optical instruments. 2. Development of skills in knowledge of physics application to the optical instruments design. 3. Team work ability development.

Course-related learning outcomes

Knowledge:
Student, who has completed the course, is able to:
1. Explain structure and principle of operation of selected optical instruments
2. Define parameters of components commonly applied to optical instruments constructions
3. Define the rules of optical instruments design and tools applicable to this process

Skills:
Student, who has completed the course, is able to:
1. Acquire from literature, databases and other sources information concerning materials, sub-assemblies and modules essential to develop simple optical instrument
2. Design simple optical instrument
3. Select materials, sub-assemblies and modules complying requirements of the technical specification as well as market economic conditions

Social competences:
Student, who has completed the course:
1. Demonstrates creativity in realization of entrusted tasks and activity in personal competence development
2. Is able to work in a team, to carry out tasks arising from division of work in a team, to take responsibility for team work results

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

W01, W02, W03, U01, K01
Assessment of knowledge and skills demonstrated in written work during the last lecture in semester on the grounds of scored points:
3,0 50.1%-70.0%
4,0 70.1%-90.0%
5,0 from 90.1%
W01, U01, U02, U03, K01, K02
Assessment on the grounds of written design documentation:
- assessment of construction assumptions and parameters calculations correctness,
- assessment of materials, sub-assemblies and modules selection correctness,
- assessment of design documentation quality,
- assessment of materials, sub-assemblies and modules selection correctness, considering instrument costs in comparison with its parameters and functionality,
- assessment of project tasks solution originality,
- assessment of dividing up of work in a team.

Programme content

1. Geometric an wave optics fundamentals
2. Basic optical components
3. Image formation by mirrors, lenses and lens systems
4. Optical aberrations
5. Interference and diffraction of light
6. Photometric and radiometric quantities
7. Light sources and detectors of light
8. Construction and parameters of selected optical instruments
9. Basic rules of optical design and design documentation development

Course topics

1. Geometric an wave optics fundamentals.
2. Properties of optical materials. Phenomena at a boundary of optical media. Coloured glass filters and their parameters.
3. Basic optical components. Lenses, mirrors, prisms - types and parameters. Polarizers - basic properties.
4. Image formation by mirrors, lenses and lens systems.
5. Optical aberrations.
6. Diffraction of light and its impact on image quality.
7. Interference of light. Antireflection coatings and multilayer dielectric mirror coatings. Interference filters.
8. Photometric and radiometric quantities.

9. Light sources.
10. Detectors of light.
11. Construction and parameters of selected optical instruments.
12. Dispersing prism and diffraction grating. Construction and parameters of optical spectrometer.
13. Precision mechanical components of optical instruments.
14. Basic rules of optical design and design documentation development.
15. Computer-aided design of optical instruments.

Teaching methods

Lecture: multimedia presentation during lecture and electronic documents containing presentation content in a condensed form made available to the students by way of on-line system eKursy.
Project classes: selected technical problem solving in the form of a individal tutorial and short multimedia presentations. Students work on their own on project documentation.

Bibliography

Basic:
1. Instrumenty optyczne, F. Ratajczyk, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2002
2. Optyka, E. Hecht, Wydawnictwo Naukowe PWN, Warszawa 2012
3. Generacja i detekcja promieniowania optycznego, J. Godlewski, Wydawnictwo Naukowe PWN, Warszawa 1997

Additional:
1. Principles of Optics, M. Born, E. Wolf, Cambridge University Press, 7th Ed., 2000
2. Lens Design Fundamentals, R. Kingslake, B. R. Johnson, Elsevier 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00