

Course “Composing and optical systems design”

Field of study: Applied and Computer Optics

Course level: Master

Specialization: 200400.68. Optical design

	Hours						
Semester	Workload	Lectures	Practical work	Lab.	Seminar	Independent studies	Tests
Spring	108	17	51	0	20	20	Test

Abstract

Course “Composing and optical systems design” contains detailed consideration of main aspects of imaging optical systems design. Theory of structural and parametrical synthesis of optical systems is described. Methods for optical system starting point selection are presented. Examples of modern optical systems design using modern powerful optical design software are given.

Goals and Objectives of the Course

Knowledge of

- composition of optical systems
- structural and parametric synthesis of optical systems

Theoretical Skills

- be able to select a starting point for optical system design
- be able to evaluate an optical system performance

Practical Skills

- be able to specify an optical imaging system
- be able to propose the optical system general layout

Course prerequisites:

Knowledge in physics, geometrical and physical optics, stops and pupils, fundamentals of ray tracing, aberrations theory, ability to work with optical design software; basic knowledge of image quality criteria and skills of optical systems parameters calculation using paraxial equations.

Course structure

Volume of the course: 3.0 ECTS credits, 108 hours

Chapter	Types of activities					Total in hours
	Lectures	Practical work	Laboratory work	Seminar	Independent studies	
Design targets and starting design	6	13	-	5	5	29
Composition of optical systems	6	20	-	8	8	42
Concept of synthesis and composing	5	18	-	7	7	37
Total:	17	51	-	20	20	108

Lectures

Hours	Theme
2	Acquaintance with optical design software
2	Main steps of optical design process
2	Main types and general classification of optical systems
2	Types of surfaces and elements and its aberrational properties
2	Composing of elements
2	Principles of correction and correction optical elements
2	Concept of synthesis and composing
3	Structural and parametric synthesis

Practical work

Hours	Theme
3	Technical and general classification and definition of optical system complexity
3	Acquaintance with optical design software. System analysis and image quality evaluation
4	Optical objectives modules
4	Optical surfaces types and optical elements synthesis
5	Basic optical elements and its properties
4	Correction optical elements and correction principles
4	“Fast” optical elements and its properties
4	“Wide-angular” optical elements and its properties
4	Optical elements combinations and aberrations correction
6	Structural synthesis of optical systems
5	Structural synthesis of optical systems of optical element where surfaces has well-known properties
5	Parametric synthesis of optical systems

Independent studies

- Preparing for laboratory works
- Writing reports
- Home work

Assessment Methods

- Test;
- Practical work;
- Home tasks
- Personal skills of a student are estimated;