

Course Manual GO

Geometrical Optics

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– General information

Long name Geometrical Optics

Approving CModule GO BaET

Responsible Prof. Dr. Michael Gartz
Professor Fakultät IME

Valid from winter semester
2021/22

Level Bachelor

Semester in the year winter semester

Duration Semester

Hours in self-study 78

ECTS 5

Professors Prof. Dr. Michael Gartz
Professor Fakultät IME

Requirements differential calculus,
integral calculus,
trigonometry,
elementary geometry

Language German

Separate final exam Yes

Literature

Pedrotti, Pedrotti, Bausch, Schmidt: Optik für
Ingenieure. Grundlagen (Springer)

Hecht: Optik (Oldenbourg)

Bergmann, Schaefer, Bd.3, Optik, de Gruyter

Schröder, Technische Optik, Vogel Verlag

Naumann, Schröder, Bauelemente der Optik,
Hanser Verlag

Saleh, Teich, Grundlagen der Photonik, Wiley-VCH

Final exam

Details

Written examination with differentiated types of exercises of taxonomy ratings understanding, appliance, analyzing and synthesizing. That means, excersises concerning lens systems have to be constructed and calculated. Optical basic principles have to be understood and have to be applied correspondig to the analyzed optical problem, done before.

Minimum standard

50 % of the exercises with different taxonomy ratings correctly processed

Exam Type

EN Klausur

– Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	Fundamental Terms and properties of optical Systems Light and radiation Delimitation of the geometrical optics to the wave optics Fundamental terms and laws of the geometrical optics main planes and main points and their meaning for optical systems aberrations definition of aperture, diaphragms, pupils and hatches dispersion of optical glasses
Knowledge	design principles of special optical systems optical imaging with mirrors optical imaging with lenses and lens-systems basic optical devices prism magnifying glass microscope telescope
Knowledge	Properties of special assembly parts of optical systems: flat-parallel plates image increase spherical aberration in case of perpendicular radiographic astigmatism in case of inclined radiographic prism beam deflection minimal deflection in case of symmetrical beam path spectral deflection
Skills	calculation of lens systems with 1 and 2 lenses: focal length object and image distance principal planes back focus length image position reproduction scale image size image orientation
Skills	drawing and construction of optical paths principal planes, main planes

Special requirements

none

Accompanying material	Presentation slides for the lecture as pdf-files, exercise task as downloadable files
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Separate exam	No
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Skills

Determination of
entrance- and spill- pupils,
entrance- and spill- hatches
principal rays

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	1
Exercises (shared course)	0
Tutorial (voluntary)	0

– Practical training

Learning goals

Goal type	Description
Skills	optical settings align
Skills	make record series of measurements and document them
Skills	generate diagrams
Skills	checking results for plausibility
Skills	recognize and understand correlations
Skills	make error analysis
Skills	realize basical optical set-ups assemble, align, make functional check
Skills	investigate natural scientific and technical principles by optical set-ups. project record series of measurements, estimate error effects, check the suitability of the set-up
Skills	make the evaluation of self generated record series of measurements present measurement values graphically calculate implicit values in correct mathematical manner from measurement values recognize logical errors and name them simulate measurement values with given formulas
Skills	compose a traceable report describe the conceptual formulation state the method of resolution represent the results in a clear manner discuss the results in a technical, academic manner

Special requirements

none

Accompanying material

written instructions to each experiment as pdf-files

Separate exam

No

Skills

work on complex technical tasks
by teamwork
organize in subtasks
present the results and make a
critical discussion

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1
Tutorial (voluntary)	0