Technology
Arts Sciences
TH Köln

Course
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
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

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

Written examination with differentiated types of exercises of taxonomy ratings understanding, appliance, analyzing and synthesizing.
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Lecture / Exercises

Learning goals

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

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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

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

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drawing and construction of
optical pathes
principal planes, main planes

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

Separate exam

none

Practical training

Learning goals

Skills

optical settings align

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make record series of measurements and document them

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generate diagrams

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checking results for plausibility

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recognize and understand correlations

make error analysis

realize basical optical set-ups
assemble, align, make functional check

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

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

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

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

Separate exam

none