Technology
Arts Sciences
TH Köln

Course Manual OD

Optical Design

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General information

Long name	Optical Design
Approving CModule	OD_BaET, OD_BaOPT
Responsible	Prof. Dr. Holger Weigand Professor Fakultät IME
Valid from	summer semester 2023
Level	Bachelor
Semester in the year	summer semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Holger Weigand Professor Fakultät IME
Requirements	Geometric optics and wave optics Foundations in Mathematics and Physics Basic knowledge of technical English
Language	German and English
Separate final exam	Yes

Literature

R. Kingslake, R. B. Johnson: Lens Design Fundamentals, 2nd Edition, Academic Press, 2009

R. Kingslake: Optical System Design, Academic Press, 1983

H. Gross (Ed.): Handbook of Optical Systems, Volume 3: Aberration Theory and Correction of Optical Systems, Wiley, 2007

W. J. Smith: Modern Optical Engineering: The Design of Optical Systems, 4th Edition, McGraw-Hill, 2007

Final exam

Details	The proof of achievement is based on a software project that deals with the design of an imaging optical system (evaluation with 60% share of the module grade). In addition, a German-language paper on selected topics in optical design is required (evaluation with 40% share of the module grade). The basis for the work is English-language technical literature.
Minimum standard	For the successful realization of the software project, basic knowledge of the used design software is required. Furthermore, the modelling of real optical systems in the context of the software used must be understood. In the preparation of the paper, it is necessary that English technical literature can be made acessible in terms of language and content. In addition, the relevant content must be reproduced in a meaningful technical text in German.
Exam Type	EN andere summarische Prüfungsform

− Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	Connection of Gaussian optics, geometric optics and wave optics Basic concepts of aberration theory Modelling an imaging system in optical design Modelling of image errors in terms of ray and wave aberrations Importance of simulation software in the context of optical design
Skills	Use of optical design software for: Structure of imaging optical systems Analysis of imaging optical systems Optimization of imaging optical systems Tolerancing of imaging optical systems

Expenditure classroom teaching

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

Special requirements

none

Accompanying material	Lecture slides (as PDF) Exercise examples (optical design files) Optical design software Software for numerical and graphic evaluations Software for scripting Software Documentation
Separate exam	Yes

Separate exam

Exam Type	EN andere studienbegleitende Prüfungsform
Details	A self-written German-language paper on selected topics of optical design is required as exam performance. Basis of the work is English-language technical literature.
Minimum standard	In the preparation of the paper, it is necessary that the English literature can be made acessible in terms of language and content. In addition, the relevant content must be reproduced in a meaningful technical text in German.

− Practical training

Learning goals

Goal type	Description
Skills	Independent development / programming of simulation scripts with the help of English-language software documentation

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	2
Tutorial (voluntary)	0

Special requirements

none

Accompanying material	see accompanying material to lecture / exercise
Separate exam	Yes

Separate exam

Exam Type	EN andere studienbegleitende Prüfungsform
Details	The proof of achievement is based on a software project that deals with the design of an imaging optical system (evaluation with 60% share of the module grade).
Minimum standard	For the successful realization of the software project, basic knowledge of the used design software is required. Furthermore, the modelling of real optical systems in the context of the software used must be understood.