Courses in English
Course Description

Department	06 Applied Sciences and Mechatronics
Course title	**Optics Design**
Course number	POM 105
Hours per week (SWS)	6
Number of ECTS credits	6
Course objective	The module provides basic knowledge about imaging and illumination optical systems, as well as the ability to design such systems and to model, analyze and optimize them using optical design software tools.
Prerequisites	BSc in a technical field; basic knowledge of phyisics, optics, and electromagnetics
Recommended reading	Nikolaus, Zeitner, Script / Lecture Slides H. Gross (Ed.), Handbook of Optical Systems Vol. 1, 3 and 4, Wiley-VCH Verlag Weinheim, (2008) R. Fischer, B. Tadic-Galeb, P. Yoder, Optical System Design, SPIE Press, New York (2008) W. J. Smith, Modern Lens Design, McGraw-Hill, New York (2005) W. J. Smith, Modern Optical Engineering, McGraw-Hill, New York (2000)
Teaching methods	Lecture, hands on exercises with optical design software
Assessment methods	Exam and excercises
Language of instruction	English
Name of lecturer	U.D. Zeitner
Email	uwe.zeitner@hm.edu
Link	https://sci-intern.hm.edu/fk/modulbeschreibungen.php?lang_nr=&id=2037
Course content	•imaging optics design fundamentals: apertures and stops, important rays, analysis and assessment of optical imaging systems •aberration theory: 3rd order aberrations (spherical aberration, astigmatism, field curvature, coma, distortion) and higher order aberrations, chromatic errors, characterization of aberrations (spot diagram, transversal ray aberration, wave-front aberration, Strehl-ratio, and MTF) •optimization: strategies for image quality improvement, optimization with standard optical design software (variables, merit-function and constraints, local and global optimization) •special optical systems: reflective systems, non-rotational symmetric systems, diffractive optics, multi-configuration systems, afocal- and telecentric systems •tolerancing: definition of tolerances and compensators, sensitivity analysis, probability distributions, and Monte-Carlo-analysis •Exercises: introduction to optics-design software Zemax OpticStudio, modeling and optimization of various optical imaging systems or sub-systems, e.g. achromats, eye-pieces, spectives and telescopes, cell-phone camera, prism-spectrometer, fiber-coupling systems, zoom systems, telecentric systems
Remarks	