Module	***Nano-Optics***
Code	
Instruction language	English
ECTS credits	4
Attendance time	2 hours per week
Duration	1 semester
Cycle	irregular
Coordinator	Dean of Physics Studies
Lecturer	Prof. Heinrich Hoerber
Allocation to study programmes	Physics M.Sc., elective module Wirtschaftsphysik M.Sc., elective module
Recommended prerequisites	
Learning objectives	Students who successfully passed this module • understand the problems of traditional electrodynamics when interactions between radiation and matter become localized far below the wavelength of the radiation involved • have enough background knowledge to understand recent developments in the use of light in new technologies and are able to apply them in their own research projects
Syllabus	The course on Nano-Optics will provide an understanding of the problems traditional Electrodynamics is facing when interactions between radiation and matter become localized far below the wavelength of the radiation involved. The path followed in a series of lectures will be along the old particle-wave discussion, which ended after Huygens with the great success for the wave description of light helping in developing a large array of optical instruments. In the second half of the course students will present recent research papers on this topic to develop an understanding of the scientific discussion and the different paths of investigations pursued. **Content** • Introduction to electromagnetic radiation • Wave description of electromagnetic radiation • Interaction of electromagnetic radiation with matter • Detection of electromagnetic radiation • Optical Microscopy •Beyond the diffraction limit • The eye as an image sensor
Literature	• Feynman R, Leighton R, and Sands M. (2006), “The Feynman Lectures on Physics” Vol. I+II. ISBN 0-8053-9045-6 • Hecht, Eugene (2001). Optics (4th ed.). Pearson Education. ISBN 978-0-8053-8566-3. • “Essential Principles of Image Sensors”, 12.8.2014 Takao Kuroda, Apple Academic Press ISBN: 1482220056 • “Anatomy and Physiology of Eye”, 2nd Edition 1.12.2008 A.K. Khurana, CBS publishers & Distributors ISBN: 8123912677

Teaching and learning methods	Lecture with exercises (24 hours lecture)
Workload	24 hours lecture (attendance time) 96 hours exercise, self-study and exam preparation Total: 120 hours
Assessment	The module assessment consists of a graded written or oral exam.
Examination	
Grading procedure	The module grade is equal to the examination grade.
Basis for	