Module title	**MScNano NQO Nanoscale Quantum Optics**
Module type	Required elective module
Educational outcomes, competencies, qualification objectives	Students … will have acquired a thorough knowledge about quantum optics applicable to the nanoscale … will be able to describe experiments which are depicting key concepts of quantum optics ... will know different experimental platforms to perform quantum optics experiments with special focus on the nano scale ... are able to present and discuss research work … will be able to understand and apply experimental and theoretical concepts from quantum information processing **Integrated key competencies:** Methodic competency: Preparation of a seminar talk
Types of courses, contact hours	VL 3 SWS S 1 SWS
Contents	**Nano Scale Quantum Optics – Basic principles** Quantization of the electro-magnetic field, quantum states of the light field, photon statistics, experimental realizations, two level systems, density matrix formalism, quantization of atom light interaction, Jaynes-Cummings-Model, dressed states, entanglement, experiments with entangled photons, measurement process, decoherence, nano scale experimental realizations of quantum optics experiments, quantum teleportation.
Course titles	Nano Scale Quantum Optics – Basic principles
Teaching methods	Lecture, Seminar
Applicability	M.Sc. Physics, M.Sc. Nanoscience
Duration	one semester
Frequency	annually in winter semester
Language	English, for a transitional period lecture notes and exam questions will also be available in German
Recommended Skills	Fundamental knowledge of Quantum mechanics on Bachelor level
Prerequisites for participation	none
Students workload	Contact time: 60 h, Independent studies: 120 h, Summe = 180 h
Course projects / nongraded learning assignments (Studienleistungen)	Active participation in seminar including exercises and seminar talk presentation
Prerequisites for admission to examination	none
Examination	Two examination parts: - written test about lecture contents (2 h) - 45 min presentation (weighted 2:1)
Number of credits	6 C (including 1 C for integrated key competencies)
Responsible coordinator	Singer
Lecturer(s)	Dawkins
Media	Blackboard, beamer, online material
Literature	**Nano Scale Quantum Optics** Gerry & Knight, Introductory quantum optics, Mark Fox, Quantum Optics: An Introduction, Oxford Master Series in Physics Haroche und Raimond, Exploring the quantum, Oxford graduate texts Also: Auletta, Fortuato und Parisi , Quantum Mechanics, Cambridge. Loudon, The Quantum theroy of light Scully & Zubairy, Quantum optics, Walls & Milburn, Quantum optics Cohen-Tannoudji, Dupont-Roc & Grynberg, Atom photon interactions,.