Universität Ulm

Master of Science Physics (PO 2017)

Seminar Physical Properties of Materials

Code	8812875019
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1 Semester
Cycle	each Winter Semester
Coordinator	Dean of Physics Studies
Instructor(s)	Prof. Dr. Ulrich Herr, Prof. Carl Krill, PhD
Allocation of study programmes	Physics M.Sc., elective Physics and Management M.Sc., elective
Recommended prerequisites	Fundamentals in material physics.
Learning objectives	The understanding of the physical properties of materials has been characterized by tremendous progress made in the last decades trough the new insights from Quantum Mechanics. As a result, new applications have been created which lead to revolutions in many aspects of our lives. The topics of this seminar comprise in particular novel techniques for imaging, sensing, and energy conversion based on properties of materials.
Syllabus	• Tomographic imaging methods: sonography, computed tomography, magnetic resonance tomography, positron emission spectroscopy, single photon emission computed tomography • Micro- and nanoscaled magnetic sensors based on GMR and TMR effect, magneto-electronics, lab-on-chip diagnostics based on magnetic nanoparticles • Physical basics and limits of photovoltaic energy conversion, thin film and nanowire solar cells, up- and down-conversion approaches for improved solar spectral matching

	• Thermo-, pyro-, piezo-and ferroelectric effect, as well as electro- and magnetocaloric effect: fundamentals and application
Literature	Nanoelectronics for Information Technology, R. Waser (Hrsg.)
Teaching and learning methods	Seminar (2 hours per week)
Workload	90 hours
Assessment	The credit points will be awarded once the colloquium (presentation and discussion) has been passed. No prerequisites are necessary for exam registration.
Grading procedure	The grade of the module will be the grade of the exam.
Basis for	Research in materials science.