

Module title					Abbreviation
Advanced Magnetic Resonance Imaging					11-MRI-Int-201-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Applied Physics				Faculty of Physics and Astronomy	
ECTS Method of grading		Only after succ. compl. of module(s)			
6	nume	rical grade			
Duration		Module level	Other prerequisites		
1 semester		graduate			
Contents					
Nuclear magnetic resonance (NMR) is a quantum mechanical phenomenon that, through magnetic resonance imaging (MRI), has played a major role in the revolution in medical imaging over the last 30 years. Starting from the fundamentals of nuclear magnetic resonance (resonance principle, relaxation times, chemical shift) this course covers 1) the NMR signal theory and signal evolution (Bloch equations) 2) the principles of spatial encoding, magnetic resonance imaging (MRI) and corresponding imaging sequences and measurement parameters, 3) the concept of k-space and Fourier imaging, 4) the physical, methodological and technical possibilities and limitations of MRI. Finally, typical application fields of MRI in biomedical research, clinical imaging and non-destructive testing will be covered. Intended learning outcomes The students are familiar with the basics and the deepened aspects of NMR and MRI including the mathema- tical-theoretical description and the physical basics of modern MRI, MRI-instrumentation and image-formati- on/image-processing principles. The students gain a deep insight into the area of modern MRI and its interdisci- plinary relations and applications.					
Courses (type, number of weekly contact hours, language — if other than German)					
V (3) + R (1) Module taught in: English					
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether					
module is creditable for bonus)					
 b) oral examination (approx. 90 to 120 minutes) or c) oral examination of one candidate each (approx. 30 minutes) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: English Assessment offered: In the semester in which the course is offered and in the subsequent semester 					
Allocation of places					
Additional information					
Workload					
180 h					
Teachir	ng cycl	9			
Teaching cycle: In the semester in which the course is offered and in the subsequent semester					

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Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Master's degree (1 major) Physics International (2020) Master's degree (1 major) Quantum Engineering (2020) exchange program Physics (2023) Master's degree (1 major) Quantum Engineering (2024) Master's degree (1 major) Physics International (2024)

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