Module name	Magnetic resonance
Number	2009-M06
Aims	Magnetic resonance, in particular NMR, is one of the very few local probes of bulk matter with applications in almost all natural sciences. Leipzig has a great tradition in applying and developing magnetic resonance in various areas. The powerful spectroscopic insight from magnetic resonance requires, however, a special knowledge of its methods, techniques, and hardware. Therefore, *basic* courses in magnetic resonance will be provided that lay the foundation for its application. Due to the exceptional breadth of applications, *advanced* courses will focus on current research needs.
Basics	Magnetic resonance (NMR and EPR) for the investigation of materials, which are the focus of the Graduate School, and their properties
Contents	Basic principles of NMR and EPR. NMR of liquids and of solids as basic analytical tool. Advanced methods (e.g., in biological systems, quantum solids, surfaces). Hardware development for special applications (thin films, high fields and frequencies).
Methods	Given the great expertise in magnetic resonance, interdisciplinary teaching (already practiced in Leipzig) will provide first-hand knowledge from leading experts in various fields. The teaching will also profit from a long-standing experience with GDCh courses where we combine lectures on various subjects with concrete experimental training at instruments, which provides hands-on education in complicated methods.
Type	Two-day block course/ September 8-9
Work load	15 hours presence/ 45 hours self-study
Examination	Written
Credit points	2
Responsible scientists	Berger, Haase
International guest lecturers	none
Industrial partners	none
Recommendations for literature, e-learning	M. Levitt, *Spin Dynamics*, VCH-Wiley S. Berger, S. Braun, *200 and More NMR Experiments*, VCH-Wiley C. P. Slichter, *Principles of Magnetic Resonance* (Springer Verlag, New York, 1990).

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SCHEDULE

Time	Lecturer	Program	Location
Tuesday, September 8th			
8.30-10.00	Haase	Introduction into Spin Resonance	TA-257
10.30-12.00	Haase	Spin and Quantum Spin Physics	
	lunch break		
2:00 – 3:00 p.m.	Haase	Seminar (group 1) Experiments (group 2): Hardware, Solid-State NMR Techniques	
3:00 – 4:00 p.m.	Haase	Seminar (group 2) Experiments (group 1): Hardware, Solid-State NMR Techniques	
Wednesday, September 9th			
8:30 – 10:00 a.m.	Berger	2-Dimensional NMR Techniques	TA 257
10:30 – 12:00	Berger	Application of NMR to Protein Research	
	lunch break		
2:00 – 3:00 p.m.	Berger	Seminar (group 1) Experiments (group 2): Practical aspects of 2D NMR, NOESY, COSY	
3:00 – 4:00 p.m	Berger	Seminar (group 2) Experiments (group 1): Practical aspects of 2D NMR, NOESY, COSY	

Didactic elements:
Lecture, discussions, presentations. practical exercises, etc.

Expected performance:
Active participation in discussions, presentations, etc.
Written Examination

Friday, September, 11th 8.30-10.00 a.m- TA 257