Module MA-INF 2312	**Image Acquisition and Analysis in Neuroscience**		
Workload 180 h	**Credit points** 6 CP	**Duration** 1 semester	**Frequency** at least every 2 years
Module coordinator	Jun.-Prof. Dr. Thomas Schultz		
Lecturer(s)	Jun.-Prof. Dr. Thomas Schultz		
Classification	**Programme** M. Sc. Computer Science	**Mode** Optional	**Semester** 1.-4..
Technical skills	Students will learn about image acquisition and analysis pipelines which are used in neuroscience. They will understand algorithms for image reconstruction, artifact removal, image registration and segmentation, as well as relevant statistical and machine learning techniques. A particular focus will be on data from Magnetic Resonance Imaging and on mathematical models for functional and diffusion MRI data.		
Soft skills	Productive work in small teams, self-dependent solution of practical problems in the area of biomedical image processing, presentation of solution strategies and implementations, self management, critical reflection of conclusions drawn from complex experimental data.		
Contents	This course covers the full image formation and analysis pipeline that is typically used in biomedical studies, from image acquisition to image processing and statistical analysis.		
Prerequisites	**Recommended:** Mathematical background (calculus, linear algebra, statistics); imperative programming.		

Format

Teaching format	**Group size**	**h/week**	**Workload[h]**	**CP**
Lecture	60	3	45 T / 45 S	3
Exercises	30	1	15 T / 75 S	3

T = face-to-face teaching; S = independent study

Exam achievements	Oral exam	(graded)
Study achievements	Successful exercise participation	(not graded)
Forms of media		
Literature	• B. Preim, C. Botha: Visual Computing for Medicine: Theory, Algorithms, and Applications. Morgan Kaufmann, 2014 • R.A. Poldrack, J.A. Mumford, T.E. Nichols: Handbook of Functional MRI Data Analysis. Cambridge University Press, 2011 • D.K. Jones: Diffusion MRI: Theory, Method, and Applications, Oxford University Press, 2011	