Module MA-INF 4302	**Advanced Learning Systems**		
Workload 180 h	**Credit points** 6 CP	**Duration** 1 semester	**Frequency** every year
Module coordinator	Prof. Dr. Stefan Wrobel		
Lecturer(s)	Prof. Dr. Stefan Wrobel, Dr. Thomas Gärtner		
Classification	**Programme** M. Sc. Computer Science	**Mode** Optional	**Semester** 2. or 3.
Technical skills	Participants specialize and require in-depth knowledge of one particular class of learning algorithms, they acquire the necessary knowledge to improve existing algorithms and construct their own within the given class, all the way up to the research frontier on the topic.		
Soft skills	In group work, students acquire the necessary social and communication skills for effective team work and project planning, and learn how to present software projects to others.		
Contents	The module is offered every year, each time concentrating on one or more specific algorithm classes, e.g. • kernel machines • neural networks • probabilistic and statistical learning approaches • logic-based learning approaches • reinforcement learning		
Prerequisites	**Recommended:** all of the following: MA-INF 4111 – Intelligent Learning and Analysis Systems: Machine Learning MA-INF 4112 – Intelligent Learning and Analysis Systems: Data Mining and Knowledge Discovery		

Format

Teaching format	**Group size**	**h/week**	**Workload[h]**	**CP**
Lecture	60	2	30 T / 45 S	2.5
Exercises	30	2	30 T / 75 S	3.5

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

Exam achievements	Written exam	(graded)
Study achievements	Successful exercise participation	(not graded)
Forms of media	lectures, exercises, software systems	
Literature	• B. Schoelkopf, A.J. Smola, Learning with Kernels, The MIT Press, 2002, Cambridge, MA • John Shawe-Taylor, Nello Christianini, Kernel Methods for Pattern Analysis, CUP, 2004 • Christopher Bishop, Pattern Recognition and Machine Learning, The University of Edinburgh, 2006 • David MacKay, Information Theory, Inference, and Learning Algorithms, 2003 • Richard Duda, Peter Hart, David Stork, Pattern Classification, John Wiley and Sons, 2001	