

Module title Machine Learning				
Module code YMAL	Level Bachelor (B.Sc.) IN, IT	Hours per week 4	ECTS credits 5	Duration 3 weeks
Module instructor Prof. Dr. Joao Paulo Papa	Lecture type Interactive seminar Individual consultations	Prerequisite(s) Good academic standing	Grading Exam Project Work Individual	
Objectives <ul style="list-style-type: none"> • Understand machine learning principles • Code and employ some state-of-the-art pattern recognition techniques • Understand deep learning basic background 				
Content <ul style="list-style-type: none"> • Supervised classification <ul style="list-style-type: none"> ○ Optimum-Path Forest ○ Probabilistic Neural Networks ○ Linear regression ○ Logistic regression ○ Bayesian Classifier • Unsupervised classification <ul style="list-style-type: none"> ○ Optimum-Path Forest ○ K-means ○ Gaussian Mixture Models • Deep learning <ul style="list-style-type: none"> ○ Restricted Boltzmann Machines (RBMs) ○ Discriminative Restricted Boltzmann Machines ○ Model selection in RBMs using Meta-heuristics • Stochastic sampling methods <ul style="list-style-type: none"> ○ Gibbs Sampling ○ Parallel Tempering ○ Tempered Transitions 				
Textbook/teaching material <ul style="list-style-type: none"> • Duda, R.O., Hart, P.E. and Stork, D.G. (2001). Pattern Classification. Wiley. ISBN: 978-0-471-05669-0 • Bengio Y., Goodfellow, I.J. and Courville, A. (2015). Deep Learning. MIT Press (in preparation). http://www.iro.umontreal.ca/~bengioy/dlbook/ • Andrieu, C., Freitas, N., Doucet, A. and Jordan, M.I. (2003). An Introduction to MCMC for Machine Learning, Machine Learning, 50(1-2), pp 5-43. 				

Note: this is not the official course descriptor according to the "Studien- und Prüfungsordnung" (SPO)