Program of Studies:	**Master Program Bioinformatics**
Name of the module:	**Special Lecture Bioinformatics: Elements of Machine Learning**
Abbreviation:	**BI-BM-1**
Subtitle:	-
Modules:	Lecture: 2 h (weekly) Tutorial: 2 h (biweekly)
Semester:	1st – 3rd semester; every winter semester
Responsible lecturers:	Prof. Dr. Isabel Valera, Prof. Dr. Jilles Vreeken
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Language:	English
Level of the unit/ Mandatory or not :	Graduate course / mandatory elective
Total workload:	150 h = 60 h of classes and 90 h private study and assignments
Credits:	6
Entrance requirements:	The course is targeted to students in computer science, bioinformatics, maths, and general sciences with a mathematical background. Students should know linear algebra and have good basic knowledge of statistics, for example by having taken Mathematics for Computer Scientists I and II (for linear algebra) and Statistics Lab or Mathematics for Computer Scientists III (for statistics).
Aims/Competences to be developed:	In this course, we will discuss the foundations - the elements - of machine learning. In particular, we will focus on the ability of, given a data set, to choose an appropriate method for analysing it, to select the appropriate parameters for the model generated by that method and to assess the quality of the resulting model. Both theoretical and practical aspects will be covered. What we cover will be relevant for computer scientists in general, as well as for other scientists involved in data analysis and modelling.

Content:	- Statistical Learning - Linear Regression I - Linear Regression II - Classification I - Classification II - Resampling & Model Selection - Regularization - Dimensionality Reduction - Unsupervised, Embeddings - Clustering - Beyond Linearity - Tree-based Methods - Support Vector Machines - Neutral Networks
Assessment/Exams:	To be eligible to participate in the exams, you will need to have cumulatively scored 50% of the points for the theoretical exercises and 50% of the points for the programming exercises.
Grade:	exam grade
Literature:	To be announced on the course website