TECHNISCHE HOCHSCHULE LÜBECK

Module: Machine Learning

Level	Bachelor	**Short Name**	ML
Responsible Lecturers	Zimmermann, Max, Prof. Dr.		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	International Track		
Compulsory/elective	Compulsory elective	**ECTS Credit Points**	5
Semester of Studies	4	**Semester Hours per Week**	4
Length (semesters)	1	**Workload (hours)**	150
Frequency	(Flexible)	**Presence Hours**	60
Teaching Language	English	**Self-Study Hours**	90

The following section is filled only if there is **exactly one** module-concluding exam.

Exam Type	Portfolio Exam	**Exam Language**	English
Exam Length (minutes)	60	**Exam Grading System**	One-third Grades

Learning Outcomes	• Students understand basic methods of statistical data analysis and machine learning and can apply them to small amounts of data. • Students can describe the difference among supervised and unsupervised learning. • Students understand basic algorithms solving the classification and clustering problems. • Students can assign ML Algorithms regarding generative and discriminative modelling. • Student can evaluate ML Algorithms w.r.t. quality by means of appropriate performance measures.
Participation Prerequisites	

The previous section is filled only if there is **exactly one** module-concluding exam.

Consideration of Gender and Diversity Issues	✘ Use of gender-neutral language (THL standard) ✔ Target group specific adjustment of didactic methods ✘ Making subject diversity visible (female researchers, cultures etc.)
Applicability	
Remarks	

TECHNISCHE HOCHSCHULE LÜBECK

Module Course: Machine Learning Lecture

(of Module: Machine Learning)

Course Type	Lecture	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	2
Participation Limit		**Semester Hours per Week**	2
Group Size		**Workload (hours)**	60
Teaching Language	English	**Presence Hours**	30
Study Achievements ("Studienleistung", SL)		**Self-Study Hours**	30
SL Length (minutes)		**SL Grading System**	

The following section is filled only if there is a course-specific exam.

Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	• Introduction to supervised and unsupervised learning. • Linear/Logistic Regression • Gradient Descent • Dimensionality Reduction • Feature Engineering • Anomaly Detection • Clustering • Decision Trees • Support Vector Machines • Generative vs. Discriminative Models • Introduction to Probabilistic Machine Learning: How to represent uncertainty • Ensemble Learning • Evaluation of Supervised and Unsupervised Methods • Interpretable Machine Learning • Frequent Pattern Mining
Literature	• Aurélien Géron: Hands–On Machine Learning with Scikit–Learn and TensorFlow; O'Reilly • Christoper M. Bishop: Pattern Recognition and Machine Learning; Springer • Christoph Molnar: Interpretable Machine Learning – A guide for making black box models explainable

Remarks	

Module Course: Machine Learning (Practical Training)

(of Module: Machine Learning)

Course Type	Practical Training	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	3
Participation Limit		**Semester Hours per Week**	2
Group Size	12	**Workload (hours)**	90
Teaching Language	English	**Presence Hours**	30
Study Achievements ("Studienleistung", SL)		**Self-Study Hours**	60
SL Length (minutes)		**SL Grading System**	

The following section is filled only if there is a course-specific exam.

Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	

Learning Outcomes	The learning outcomes correspond to those of the corresponding lecture. In addition, the students strengthened their skills in team organization, moderation, conflict resolution and presentation techniques.
Participation Prerequisites	Basic Knowledge of Python

The previous section is filled only if there is a course-specific exam.

Contents	The practical training intends to apply the teaching content presented in the lecture.
Literature	
Remarks	