Geo Data Science

Module title:		**Credits:**	**Responsible person:**
Geo Data Science		6	Kada, Martin
		Office:	**Contact person:**
		H 12	*No information*
Website:		**Display language:**	**E-mail address:**
No information		Englisch	martin.kada@tu-berlin.de

Learning Outcomes

Students have a profound understanding of the scientific fields of data science, big data and machine learning in general and applied to geographical data. They have acquired theoretical and practical knowledge in geo data management, manipulation, and visualization as well as familiarity with big data technologies. Students understand the mathematical background, the working principles, and applications of machine learning algorithms. They are able to transfer real-world problems from the geo-sciences into machine learning models, find and develop solution strategies, and implement them programmatically using Python in conjunction with the respective standard software libraries.

Content

Exploratory thematic and spatial data analysis (with Python), statistical analytics, correlation, data manipulation and cleaning, feature extraction from geographical data, supervised vs. unsupervised learning, linear and polynomial regression, regularized linear models, logistic and multinomial logistic regression, cost functions, model training and fine-tuning, gradient descent, learning curves, performance measures, support vector machines, decision trees, random forests, ensemble learning, dimensionality reduction, segmentation and clustering (k-means, hierarchical clustering, DBSCAN), privacy and ethics in data science, Python numerical, scientific, and machine learning libraries (e.g. NumPy, SciPy, pandas, GeoPandas, scikit-learn).

Module Components

Course Name	Type	Number	Cycle	SWS
Geo Data Science	UE		SS	2
Geo Data Science	VL		SS	2

Workload and Credit Points

Geo Data Science (Übung)	Multiplier	Hours	Total
Attendance	15.0	2.0h	30.0h
Pre/post processing	15.0	4.0h	60.0h
			90.0h

Geo Data Science (Vorlesung)	Multiplier	Hours	Total
Attendance	15.0	2.0h	30.0h
Pre/post processing	15.0	4.0h	60.0h
			90.0h

The Workload of the module sums up to 180.0 Hours. Therefore the module contains 6 Credits.

Description of Teaching and Learning Methods

Lectures (45%), exercises (45%), and independent reading (10%).

Requirements for participation and examination

Desirable prerequisites for participation in the courses:

Profound knowledge of geographical data representations and linear algebra, basic knowledge and experience in programming with Python.

Mandatory requirements for the module test application:

No information

Module completion

Grading:	Type of exam:	Language:	Duration/Extent:
graded	Oral exam	English	30 Minutes

Duration of the Module

This module can be completed in one semester.

Maximum Number of Participants

This module is not limited to a number of students.

Registration Procedures

No information.

Recommended reading, Lecture notes

Lecture notes:
unavailable

Electronical lecture notes :
available

Assigned Degree Programs

This moduleversion is used in the following modulelists:

Environmental Planning (Master of Science)

StuPO (15.12.2010)
    Modullisten der Semester: WS 2020/21 SoSe 2021

Environmental Planning (Master of Science)

StuPO (13.12.2017)
    Modullisten der Semester: WS 2020/21 SoSe 2021

Geodesy and Geoinformation Science (Master of Science)

StuPO (21.03.2007)
    Modullisten der Semester: WS 2020/21

Ökologie und Umweltplanung (Bachelor of Science)

StuPO 11.07.2012
    Modullisten der Semester: WS 2020/21 SoSe 2021

Ökologie und Umweltplanung (Bachelor of Science)

StuPO 20.02.2019
    Modullisten der Semester: WS 2020/21 SoSe 2021

Ökologie und Umweltplanung (Master of Science)

StuPO 2016
    Modullisten der Semester: WS 2020/21 SoSe 2021

Miscellaneous

No information