

Module Name		Module Code wird vom PA vergeben	
Introduction to Machine Learning applications in agriculture and food systems		agrarAEF901-01a	
Module Coordinator			
Jun.-Prof. Dr. Lucie Maruejols			
Organizer			
Department of Agricultural Economics			
Faculty			
Faculty of Agricultural and Nutritional Sciences			
Examination Office			
Faculty of Agricultural and Nutritional Sciences - Examination Office			
ECTS Credits	6		
Evaluation	Graded		
Duration	ein Semester		
Frequency	Only takes place during summer semesters		
Workload per ECTS Credit	30 hours		
Total Workload	180 hours		
Contact Time	60 hours		
Independent Study	120 hours		
Teaching Language	English		
Recommended Requirements			
Basic knowledge of algebra and statistics			
Module Courses			
Course Type	Course Name	Compulsory/Optional	SWS
Lecture	Introduction to Machine Learning applications in agriculture and food systems	Compulsory	2
Practice	Introduction to Machine Learning applications in agriculture and food systems	Compulsory	2
Prerequisites for Admission to the Examination(s)			
Basic knowledge of algebra and statistics			

Examination(s)				
Examination Name	Type of Examination	Evaluation	Compulsory / Optional	Weighting
Written Exam Introduction to Machine Learning applications in agriculture and food systems	Written Exam	Graded	Compulsory	100
Further Information on the Examination(s)				
QIS: 149000 with number of Examination 149010				
Course Content				
<p>Machine learning is a branch of artificial intelligence that focuses on data analysis and is being quickly adopted by businesses and researchers of the agri-food sector to perform quantitative analysis tasks, predictions and decision-making. Applications include prediction of yield, price, or program participation; discovering clusters and patterns in data, such as groups of customers or farmers with similar preferences; treatment of satellite data for recognizing land use, or human development markers. The course will show how machine learning can be applied to the fields of agri-food, nutrition, economics, policy analysis, poverty and sustainability. This a hands-on course that focuses on intuitive understanding and implementation of the methods for real-life applications. Therefore, the mathematical foundations are not reviewed in depth. This aims to provide an overview of the techniques and their limitations, and a first experience analyzing data with machine learning algorithms.</p> <p>Lecture: Overview of machine learning principles, applications to agribusiness, food and nutrition and agricultural sector, overview of big data sources and potential, comparison with econometrics, types of quantitative problems (prediction, causal analysis), limitations of machine learning.</p> <p>Practice: data import in Python and/or R, data preparation and visualization, data analysis with basic machine learning algorithms, results interpretation. Students get the chance to explore data from the agriculture and food sectors, but can also bring their own data, for example as preparation for their master thesis.</p> <p>The course is targeted at students from all areas of agriculture, food, nutrition, or economics, who want to acquire tools for data analysis, as well as students of computer sciences interested in applications of the methods to real-life situations.</p>				
Learning Outcome				
<p>Students gain an understanding of basic machine learning methods, their purpose and functioning, as well as the potential for applications in agriculture and food systems. Students will be able to distinguish between machine learning and other statistics techniques (e.g. econometrics), based on advantages and limitations of the methods, and use this to select the methods that best fit specific data analysis problem. Students will be able to prepare and analyze data from the agri-food sector such as food consumption, food prices, weather data, crop yield, production inputs (e.g. labour, land size, soil quality). Students learn to interpret results of key algorithms of machine learning (e.g. lasso, random forest, clustering, neural network, time series, natural language processing...). Attention will be given to applications in context of decision-making situations, for example by businesses, farm operations or by policy analysts. A large part of the exercise is dedicated to learning coding in Python and/or R for the purpose of data analysis. Students will have the chance to practice the tools they learn with their own data or projects, which can be used as preparation for their master thesis.</p>				
Reading List				
<p>Mastering Machine Learning with Python in Six Steps, Manohar Swamynathan, ISBN-13 (electronic): 978-1-4842-2866-1, 2017</p> <p>Machine Learning Using R, Karthik Ramasubramanian and Abhishek Singh, ISBN-13 (electronic): 978-1-</p>				

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Additional Information

Maximum number of participants: 25 (please enter, if the module is space limited)

Enrollment by OLAT within workdays Monday through Friday in the 1st week of the 2. audit period of the preceding semester. Following information is necessary:

matriculation number

last name

first name

striven degree

study program

stu-Email

The allocation of the places takes place in the 2nd week of the 2. audit period of the preceding semester. Acceptance of the place by students only through participation at the first day of the course. Students without a place can get a place at the first day of the course by move-up procedure.

Use	Compulsory / Optional	Semester
Master, 1-subject, Agricultural Sciences, Agricultural Economics	Optional	-
Master, 1- subject, Agricultural Sciences, Agribusiness	Optional	-
Master, 1- subject, Agricultural Sciences, Crop Sciences	Optional	-
Master, 1- subject, Agricultural Sciences, Animal Sciences	Optional	-
Master, 1- subject, Agricultural Sciences, Environmental Sciences	Optional	-
Master, 1- subject, Nutritional and Food Sciences	Optional	-
Master, 1-subject; Nutritional and Consumer Economics	Optional	-
Master, 1- subject, Environmental and Resource Economics [Exportmodul]	Optional	-
MSc in Computer Science + Business Information Technology	Optional	-
BSc in Computer Science + Business Information Technology	Optional	-