

Module Name	Module Code
Management of Soil Resources	EMAEF047-01a
Module Coordinator	
Prof. Dr. Sandra Spielvogel	
Organizer	
Institute of Plant Nutrition and Soil Science - Soil Science	
Faculty	
Faculty of Agricultural and Nutritional Sciences	
Examination Office	
Faculty of Agricultural and Nutritional Sciences - Examination Office	

ECTS Credits	6
Evaluation	Graded
Duration	one semester
Frequency	Only takes place during sommer semesters
Workload per ECTS Credit	30 hours
Total Workload	180 hours
Contact Time	60 hours
Independent Study	120 hours
Teaching Language	English

Recommended Requirements			
Knowledge of the basics of soil science			
Module Courses			
Course Type	Course Name	Compul- sory/Optional	SWS
Lecture	Preservation of soil fertility and sustainable soil	Compulsory	2
Seminar	Analytical methods for water and nutrient transport in soils	Compulsory	2

Examination(s)				
Examination Name	Type of Examination	Evaluation	Compulsory / Optional	Weighting
Oral Examination	Oral Examination	Graded	Compulsory	100
Further Information on the Examination(s)				
1.+2. period in summer semester 1. period in winter semester examiner: Spielvogel/Löppmann				

Course Content
<p>In the lecture "Preservation of soil fertility and sustainable soil management", students deal with the legal framework of soil protection in Germany and learn about important precautionary measures against the occurrence of harmful soil changes:</p> <ul style="list-style-type: none"> - Precautionary measures to maintain the "humus content typical of the site" - Precautionary measures against soil compaction - Precautionary measures against soil erosion - Precautionary measures against soil acidification - Precautionary measures against the loss of biodiversity - Precautionary measures against material pollution of soils - Protection of soil organisms in the approval process for plant protection products <p>In the second part of the lecture, students learn about the soils of the most important agricultural areas in Germany and the soils of special crops, as well as their particular characteristics. In detail, these are</p> <ul style="list-style-type: none"> - Soils of the cereal and sugar beet growing areas (example Magdeburger Börde) - Soils of potato-growing areas - Soils under grassland (using the example of the Alps and the North Sea coast) - Soils of fruit and vegetable growing areas (example Lake Constance) - Soils under special crops: hops (Hallertau), wine (Upper Rhine Valley, Moselle). <p>Students learn about soil management measures with special consideration of climate effectiveness, biodiversity and sustainability of the different cultivation systems.</p> <ul style="list-style-type: none"> - Water and nutrient retention in the soil - Soil as a pollutant filter - Soil water - Vertical soil water movement - Water availability - Hydraulic potential - Transport models - Model types and soil water balance - Water movement - Water conductivity - Evaporation - Van Genuchten model - Infiltration <p>This course provides insight into the modeling of water and nutrient transport in soil. Students work on realistic examples to simulate water and solute movement in one-dimensional, variably saturated media using the HYDRUS-1D modeling program. They analyze and interpret the model results and learn to better understand the interactions and existing processes between soil and plants in the agroecosystem.</p> <p>The students independently model the vertical water movement in soils using several examples and thus arrive at a realistic estimate of the respective soil water conditions. The example tasks increase in complexity.</p>

Learning Outcome
<ul style="list-style-type: none"> - Students are familiar with the legal framework of soil protection in Germany and can safely apply important precautionary measures to protect agricultural soils. - Students learn about the versatility and diversity of Germany's agricultural landscapes from a pedological perspective. - Based on the soil conditions and the main crops of different agricultural areas in Germany, students learn about soil management measures with special consideration of climate effectiveness, biodiversity and sustainability of the different cultivation systems. - Based on the different soil regions and crops, students deal with specific threats to the ecosystem services of soils in the different cultivation regions. - Students acquire in-depth knowledge of soil formation, soil properties and soil use in the world's most important ecozones. - Students deal with practical land use problems that are typical for soil use in the different ecozones. - Students gain an in-depth understanding of the processes involved in changes in vertical soil water transport as a result of management and climate. - Students are able to process data independently within the framework of modeling. - Students apply simple hydrological models for water and nutrient movement in the soil. - Students interpret the model results with regard to their change with divergent soil functions. - Students practise working independently on specific case studies. - Students develop their problem-solving skills using specific case studies.
Reading List
Lecture slides; scientific publications (provided during the course)

Use	Compulsory / Optional	Semester
Master, 1-Subject, Agricultural Sciences, Specialisation Agricultural Economics, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Agribusiness, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Animal Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Environmental Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Environmental Management, Double-Degree-Agreement with Adam-Mickiewicz-University, Polen (UAM), (Version 2020)	Optional	-
Master, 1-Subject, Environmental Management, Double-Degree-Agreement with Irkutsk State University, Russland (ISU), (Version 2020)	Optional	-
Master, 1-Subject, Environmental Management, (Version 2020)	Optional	-
Master, 1-Subject, Nutritional and Food Science, (Version 2013)	Optional	-
Master, 1-Subject, Nutritional and Consumer Economics, (Version 2017)	Optional	-