

<b>Module Name</b>	<b>Module Code</b>
Analysis Methods in Hydrochemistry	EMAEF045-01a
<b>Module Coordinator</b>	
Prof. Dr. Nicola Fohrer	
<b>Organizer</b>	
Institute for Natural Resource Conservation - Hydrology and Water Resources Management	
<b>Faculty</b>	
Faculty of Agricultural and Nutritional Sciences	
<b>Examination Office</b>	
Faculty of Agricultural and Nutritional Sciences - Examination Office	

<b>ECTS Credits</b>	6
<b>Evaluation</b>	Graded
<b>Duration</b>	1 Semester
<b>Frequency</b>	Only takes place during winter semesters
<b>Workload per ECTS Credit</b>	30 Hours
<b>Total Workload</b>	180 Hours
<b>Contact Time</b>	60 hours
<b>Independent Study</b>	120 hours
<b>Teaching Language</b>	English

<b>Module Courses</b>			
<b>Course Type</b>	<b>Course Name</b>	<b>Compulsory/Optional</b>	<b>SWS</b>
Lecture	Introduction to Hydrochemistry	Compulsory	1
Field trip	Field Sampling Strategies and in situ Parameters	Compulsory	1
Exercise	Introduction to Analysis Methods in Hydrochemistry	Compulsory	2

<b>Examination(s)</b>				
<b>Examination Name</b>	<b>Type of Examination</b>	<b>Evaluation</b>	<b>Compulsory / Optional</b>	<b>Weighting</b>
Protocol: Analysis Methods in Hydrochemistry	Protocol	Graded	Compulsory	100
<b>Further Information on the Examination(s)</b>				
1. + 2. Period in winter semester 1. Period in summer semester Examiner: Dr. Daniel Rosado, Dr. Uta Ulrich QIS: 79400 with number of Examination 79410				

<b>Course Content</b>
Principles of analytical processes from in situ measurements, sampling strategies to laboratory analysis in hydrochemistry. Practical application of standard techniques in hydrochemistry, data analysis and environmental interpretation.
<b>Learning Outcome</b>
Knowledge of hydro-chemical in situ measurements, representative sampling and lab analysis techniques, possibilities and challenges, error sources and limitations of measurement techniques. Students are able to understand and carry out standard methods in hydrochemistry. They are able to understand the concepts of calibration, detection limits and error sources in lab analysis. They are capable of data interpretation and compilation of lab protocols and reports.
<b>Reading List</b>
<p>Arikawa, Y, (2001). "Basic Education in Analytical Chemistry", Analytical Sciences. 17 (Supplement): i571–i573</p> <p>Atkins, P.; de Paula, J.; Keeler, J. (2016): Physical Chemistry. Oxford University Press ISBN 978-0-19-881474-0. Or any other reader on PC</p> <p>Ewing, G.W. (1977): Environmental Analysis. Academic Press, New York</p> <p>Hewitt C.N. ed.. (1991): Instrumental analysis of pollutants. Elsevier, London</p> <p>Keith, L.H., ed. (1988): Principles of environmental sampling. American Chemical Society XXIV, 458 p. Washington, D.C. : American Chemical Society</p> <p>Lieth H, Markert B (eds.) (1990) Element Concentration Cadasters in Ecosystems. Methods of Assessment and Evaluation. VCH, Weinheim</p> <p>Markert, B (ed.) (1994) Environmental Sampling for Trace Analysis. VCH, Weinheim</p> <p>Schwedt G. Schmidt, T.C.; Schmitz, O.J. (2016): Analytische Chemie - Grundlagen, Methoden und Praxis. VCH Weinheim. ISBN: 978-3-527-34082-8</p> <p>Skoog, D.A.; Holler, F.J.; Crouch, S.R. (2007). Principles of Instrumental Analysis. Belmont, CA: Brooks/Cole, Thomson. p. 1. ISBN 978-0-495-01201-6</p> <p>Skoog, D.A.; West, D.M.; Holler, F. J.; Crouch, S.R. (2014). Fundamentals of Analytical Chemistry. Belmont: Brooks/Cole, Cengage Learning. p. 1. ISBN 978-0-495-55832-3</p> <p>Stumm, W.; Morgan W.W. (1995): Aquatic Chemistry, Wiley New York</p> <p>Subramania G. (1995): (Quality Assurance in Environmental Monitoring – Instrumental Methods. VCH Weinheim, ISBN 3-527-28668-3</p>
<b>Additional Information</b>
<p>Maximum number of participants: 20</p> <p>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:</p> <p>last name first name striven degree study program stu-mail</p> <p>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</p>

<b>Use</b>	<b>Compulsory / Optional</b>	<b>Semester</b>
Master, 1-Subject, Agricultural Sciences, Specialisation Agricultural Economics, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Agricultural Economics, (Version 2013)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Agribusiness, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Agribusiness, (Version 2013)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Crop Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Crop Sciences, (Version 2013)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Animal Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Animal Sciences, (Version 2013)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Environmental Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Environmental Sciences, (Version 2013)	Optional	-
Master, 1-Subject, Applied Ecology, (Version 2016)	Optional	-
Master, 1-Subject, Applied Ecology, (Version 2015)	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, Environmental Management, (Version 2017)	Optional	-
Master, 1-Subject, Environmental Management, (Version 2013)	Optional	-
Master, 1-Subject, Nutritional and Food Science, (Version 2013)	Optional	-
Master, 1-Subject, Nutritional and Consumer Economics, (Version 2017)	Optional	-
Master, 1-Subject, Nutritional and Consumer Economics, (Version 2013)	Optional	-
Master, 1-Subject, Sustainability, Society and the Environment, (Version 2013)	Optional	-