

Module name		Elective Practical Course Analytical Chemistry - Water and Soil				
Abbreviation		MPR				
Turnus annual	Duration 1 semester	Semester of study 1 to 4	Credits 9	Assignment curriculum M. Sc. Chemistry Subject: AnC Focus: M. M. (here subject: AC or OC)		
Module structure						
No.	Course	Type	CP	SWS	Presence-time	Own-study
1	Practical Course Analytical Chemistry - Water and Soil	P	6	8	120 h	60 h
2	Seminar on Practical Course Analytical Chemistry - Water and Soil	S	3	2	30 h	60 h
Total			9	10	150 h	120 h
Person(s) responsible for the module		Dr. Sebastian Zühlke				
Lecturer(s)		Dr. Sebastian Zühlke				
Language		German, English				
Requirements according to examination regulations		None				
Recommended requirements		Participation in the module Analytical Chemistry - Water and Soil I or Introduction to Mass Spectrometry.				
Study/examination achievements		Course work: Preparing the experimental plan, colloquium before the start of the experiment, carrying out the experiment. Examination: Final protocol (70%) and presentations (30%)				
Learning objectives		The students acquire an overview of the common methods of water and soil analysis in practice. They can independently carry out modern sample preparations, separation methods and analyte detections.				
Learning outcomes and competencies		Upon completion of the module, students will be able to, <ul style="list-style-type: none"> - Perform basic analytical separation methods and sample preparation of water and soil analysis. - operate a wide variety of hardware and software devices. 				

	<ul style="list-style-type: none"> - Determine method characteristics for chromatographic separations/spectroscopic detections. - apply acquired theoretical knowledge and subject-specific practical knowledge to solve analytical problems.
Content	<ol style="list-style-type: none"> 1. Sampling and sample preparation for water and soil 2. Enrichment and extraction techniques <ul style="list-style-type: none"> - SPE - SPME - LSE - Sonication - ASE 3. Chromatographic techniques <ul style="list-style-type: none"> - GC - HPLC - IC - detector coupling (MS, tandem-MS, HR-MS, DAD) 4. Qualitative and quantitative evaluation of the study results. 5. Design/conduct experiments on the degradation/fate of organic pollutants in water and soil.
Media forms	script, PowerPoint presentations at seminars, control of instrumental analysis devices via software, evaluations at own computer workstations, further working materials
Literature	<ul style="list-style-type: none"> • Niessner, Schäffer: Organic Trace Analysis, Walter de Gruyter GmbH, Berlin/Boston, 2017 • Georg Schwedt: The Essential Guide to Analytical Chemistry, Wiley-VCH, 1997 • Georg Schwedt: Taschenatlas der Analytik, Wiley-VCH, 2007 • Bracher, F. et al.: Arbeitsbuch instrumentelle Analytik, Govi-Verlag GmbH, Eschborn, 2008 • H.-J. Hübschmann: Handbook of GC/MS: Fundamentals and Applications, Wiley-VCH; 3. Edition, 2015 • Georg Schwedt: Analytical Chemistry, Wiley-VCH, 2008