

<b>Module name</b>		Elective Lecture <b>Analytical Chemistry - Water and Soil I</b>					
<b>Abbreviation</b>		MWV					
<b>Turnus</b> 2-yearly WS even year	<b>Duration</b> 1 semester	<b>Semester of study</b> 1 to 4	<b>Credits</b> 4	<b>Assignment curriculum</b> M. Sc. Chemistry Subject: AnC Focus: M. M. (here subject: AC or OC) M. Sc. Chemical Biology Subject: SoC			
<b>Module structure</b>							
<b>No.</b>	<b>Course</b>	<b>Type</b>	<b>CP</b>	<b>SWS</b>	<b>Presence-time</b>	<b>Own-study</b>	
1	Analytical Chemistry - Water and Soil I	V	3	2	30 h	60 h	
2	Exercises for Analytical Chemistry - Water and Soil I	Ü	1	1	15 h	15 h	
<b>Total</b>			4	3	45 h	75 h	
<b>Person(s) responsible for the module</b>		Dr. Sebastian Zühlke					
<b>Lecturer(s)</b>		Dr. Sebastian Zühlke					
<b>Language</b>		English					
<b>Requirements according to examination regulations</b>		None					
<b>Recommended requirements</b>		Sufficient knowledge of Analytical Chemistry and basic knowledge of mathematics is advantageous.					
<b>Study/examination achievements</b>		Written or oral exam at the end of the module Repeatability and rotation according to PO					
<b>Learning objectives</b>		The students gain an overview of the common methods of water and soil analysis. In particular, the modern sample preparation and separation methods as well as the functioning of the devices and application areas.					
<b>Learning outcomes and competencies</b>		Upon completion of the module, students will be able to, <ul style="list-style-type: none"> <li>- classify basic analytical separation methods and sample preparations of water and soil analysis.</li> <li>- apply knowledge in the field of equipment used and decide on their scope of application (depending on the problem).</li> <li>- explain theoretical background of the methods in detail.</li> </ul>					

	<ul style="list-style-type: none"> <li>- determine method characteristics for chromatographic separations.</li> <li>- use acquired theoretical knowledge for the practice-oriented solution of analytical problems.</li> <li>- Evaluate validity and safety of experimental measurements.</li> <li>- present scientific facts correctly in spoken and written language and discuss them with others.</li> </ul>
<b>Content</b>	<ol style="list-style-type: none"> <li>1. Environmental analytics in general <ul style="list-style-type: none"> <li>- Identification and quantitation</li> <li>- Calibration and validation</li> <li>- Chromatographic techniques for sample preparation and analyte separation (GC, LC, SFC, DC, IC)</li> <li>- Detectors for GC and HPLC (MS, HR-MS, IR, DAD, fluorescence, AED)</li> <li>- Stable isotope analysis</li> <li>- <sup>14</sup>C analytics</li> <li>- Sampling</li> <li>- Experimental design and evaluation of experiments</li> <li>- Current trends and research methods</li> </ul> </li> <li>2. Water <ul style="list-style-type: none"> <li>- Turbidimetry and photometry</li> <li>- Enrichment techniques (SPE, SPME, FFE)</li> <li>- Volatile compounds by means of headspace and purge&amp;trap</li> </ul> </li> <li>3. Soil <ul style="list-style-type: none"> <li>- Inorganic parameters (AAS, AES, ICP-MS)</li> <li>- Sorption to surfaces/soil</li> <li>- organic sum parameters</li> <li>- Degradation, sorption and mobility of organic pollutants (e.g. PAHs, pesticides)</li> <li>- Extraction methods from solid matrix (ASE, SFE)</li> </ul> </li> </ol>
<b>Media forms</b>	Powerpoint presentations, electronic scripts, blackboard pictures, other working materials, exercises at computer workstations
<b>Literature</b>	<ul style="list-style-type: none"> <li>• Georg Schwedt: Taschenatlas der Analytik, Wiley-VCH, 2007</li> <li>• Niessner, Schäffer: Organic Trace Analysis, Walter de Gruyter GmbH, Berlin/Boston, 2017</li> <li>• Georg Schwedt: The Essential Guide to Analytical Chemistry, Wiley-VCH, 1997</li> <li>• Jürgen Schwörbel, Heinz Brendelberger: Einführung in die Limnologie, 9.Auflage, Spektrum Verlag, 2005</li> <li>• Marc Pansu, Jacques Gautheyrou: Handbook of Soil Analysis, Springer Verlag Berlin, 2006</li> <li>• Bracher, F. et al.: Arbeitsbuch instrumentelle Analytik, Govi-Verlag GmbH, Eschborn, 2008</li> </ul>

- |  |   |
|--|---|
|  | <ul style="list-style-type: none"><li>• H.-J. Hübschmann: Handbook of GC/MS: Fundamentals and Applications, Wiley-VCH; 3. Edition, 2015</li></ul> |
|--|---|