

<b>Module code</b> (1.)	<b>Module description</b> (2.)	<b>Category</b> (3.)
MBI 2540 Stand: 07.10.2021	Hydraulic Engineering in Urban Environment	Int. Master
	<b>Degree program</b> (4.)	Sustainable Engineering of Infrastructure
	<b>Faculty</b> (5.)	Civil Engineering and Conservation / Restoration

<b>Module supervisor</b> (6.)	Prof. Dr.-Ing. Volker Spork
<b>Type of module</b> (7.)	P (obligatory)
<b>Frequency</b> (8.)	Annually
<b>Standard semester of study</b> (9.)	2nd semester
<b>Credits (ECTS)</b> (10.)	5 ETCS
<b>Assessment</b> (11.)	Written examination
<b>Language of instruction</b> (12.)	English
<b>Admission requirements</b> (13.)	Basic knowledge of hydromechanics and hydraulic engineering
<b>Module is a requirement for</b> (14.)	-
<b>Module duration</b> (15.)	1 semester
<b>Mandatory registration</b> (16.)	No
<b>Applicability of module</b> (17.)	Civil Engineering

<b>Course</b> (18.)	<b>Lecturer</b> (19.)	<b>Type</b> (20.)	<b>No. of students (max.)</b> (21.)	<b>No. of courses per week</b> (22.)	<b>Contact hours per week</b> (23.)	<b>Workload</b>		
						<b>Face-to-face</b> (24.)	<b>Self-study</b> (25.)	
<b>1</b> Hydraulic Engineering in Urban Environment	Prof. Dr. Spork	Lecture	25	1	2	30	40	
<b>2</b> Hydraulic Engineering in Urban Environment	Prof. Dr. Spork	Tutorial	25	1	2	30	50	
<b>Total</b>					<b>4</b>	<b>60</b>	<b>90</b>	
<b>Workload for the module</b> (26.)							<b>150</b>	

<b>Learning objectives</b> (27.)	Having successfully completed the module, students can plan and dimension river training works, structures with watercourse passability and flood protection measures in urban areas. Furthermore, they can select 1D and 2D hydrodynamic numerical models for the quantitative assessment of hydraulic-hydrological changes in running water bodies caused by construction works and then apply them in the planning process.
<b>Course contents</b> (28.)	<ul style="list-style-type: none"> <li>• Function and use of watercourses in urban areas</li> <li>• River training works <ul style="list-style-type: none"> <li>○ objectives of river training</li> <li>○ nature-orientated watercourse development</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ urban ecology in the planning process</li> <li>○ watercourse maintenance</li> <li>● Watercourse passability <ul style="list-style-type: none"> <li>○ bottom ramps and slopes</li> <li>○ fish passes (pool and slot passes)</li> </ul> </li> <li>● Flood protection <ul style="list-style-type: none"> <li>○ flood prevention</li> <li>○ technical flood control <ul style="list-style-type: none"> <li>▪ flood control reservoirs</li> <li>▪ flood bypasses</li> <li>▪ polders</li> <li>▪ concrete flood walls</li> <li>▪ dikes</li> </ul> </li> </ul> </li> <li>● Hydrological Modeling <ul style="list-style-type: none"> <li>○ HEC-HMS project work, flood routing</li> </ul> </li> <li>● Hydrodynamic numerical modeling <ul style="list-style-type: none"> <li>○ mathematical description of multidimensional flow phenomena</li> <li>○ numerical solution methods</li> <li>○ modeling process</li> <li>○ 1D hydrodynamic-numerical modeling, HEC-RAS project work</li> <li>○ 2D hydrodynamic-numerical modeling, HYDRO_AS-2D or HEC-RAS or BASEMENT project work</li> </ul> </li> <li>● Legal aspects (e.g. international water law, EU-Water Framework Directive, Flood Risk Management Directive)</li> </ul>
<b>Preliminary exam requirements and assessment</b>	<p style="text-align: right;">(29.)</p> <ul style="list-style-type: none"> <li>● Final written examination</li> <li>● Assessed using grades 1-5</li> <li>● Module grade is included in the overall grade in proportion to the number of credits earned</li> </ul>
<b>Literature</b>	<p style="text-align: right;">(30.)</p> <ul style="list-style-type: none"> <li>● Patt, H.: Hochwasser-Handbuch, Springer Verlag</li> <li>● Patt, H. et al.: Naturnaher Wasserbau, Springer Verlag</li> <li>● Heimerl, St. (ed.): Biologische Durchgängigkeit von Fließgewässern, Springer Verlag</li> <li>● Guidelines of the DWA (or DVWK), BWK</li> <li>● EU guidelines and legal texts</li> <li>● Software manuals</li> </ul>