

**Bauhaus-Universität Weimar / Faculty of Civil Engineering  
M. Sc. Natural Hazards and Risks in Structural Engineering [NHRE] /  
M. Sc. Bauingenieurwesen - Konstruktiver Ingenieurbau**

**Experimental testing based on impact and resistance: wind, fire and earthquake**

Module-No.: ...

Semester No.	Frequency of the module offering	Duration	Type of module	Credit points (ECTS)	Language(s)	Student workload
3	annually in Winter Semester	1 Semester weekly	Elective compulsory	6	English	180hs, thereof 60hs Attendance time, 60hs Project work 60hs Self-study and exam-preparation time

Recommended course requirements	Course program	Form of examination / Duration of examination	Teaching and learning methods	Responsible for the module
B.Sc. Basics in: - signal processing - dynamics - matlab or python	NHRE other	<b>Project presentation (oral), 50%</b> <b>Project report, 50%</b>	Lecture (L) Project (P)	Jun.-Prof. Dr.-Ing. Lars Abrahamczyk

**Course aim**

Students will be familiar with principles of the design and setup, as well as evaluation and interpretation of experimental testing in structural engineering, by attending the experiments in a virtual environment. The students will be encouraged to apply their theoretical knowledge and competences for solving complex practical tasks, and thus, to build their own "mental models". It will be focused on the special and diverse demands in the elaboration of repeatable and destructive testing. Students will be familiar with instrumental methods and instrumentation requirements to provide structure related parameters and characteristic e.g. force-displacement relationships in support of analytical studies. Students should be able to decide upon appropriate test configuration for particular problems and to formulate the right questions in preparation of experimental studies. Students will be trained in distant group work.

**Course content**

Lectures: (hybrid format)

Theoretical background about experimental testing based on impact and resistance with focus on wind, fire and earthquake; testing facilities and technical equipment; demands on specimens and scaling requirements; arrangement of sensors; application of equivalent impact/action (e.g. forces) in pseudo static and dynamic testing; physical interpretation and presentation of experimental data;

Project:

Training of modelling and analysis methods; study of code requirements and their application to different structural systems; evaluation of structural performance for wind and seismic action; Tools: Matlab or Python; SAP2000

Workshop / Excursion (presence):

Training in and practicing presentation skills; visit of construction sites; networking;  
Date: from 24<sup>th</sup> to 31<sup>st</sup> of March 2023  
Place: Weimar and Bochum

**Course literature**

Textbooks (to be announced)

<b>Courses</b>		
<b>Lecturer</b>	<b>Title of the course</b>	<b>Semester periods per week (SPW)</b>
Prof. L. Abrahamczyk Prof. R. Höffer (RUB) Prof. N. Lopes (UA) Prof. D. Penava (UNIOS) Prof. ... (IZIIS)	Experimental testing based on impact and resistance: wind, fire and earthquake (L)	3
Prof. L. Abrahamczyk Prof. R. Höffer (RUB) Prof. N. Lopes (UA) Prof. D. Penava (UNIOS) Prof. ... (IZIIS)	Group project: Assessment of structures under wind, fire, and earthquake (P)	3