

Bauhaus-Universität Weimar / Faculty of Civil and Environmental Engineering
M. Sc. ...

Forensic Structural Engineering						Module-No.: ...
Semester No.	Frequency of the module offering	Duration	Type of module	Credit points (ECTS)	Language	Student workload
2 OR 4	annually in Summer Semester	1 Semester weekly (April – June)	Elective	6	English	180hs, thereof 50 hrs Attendance time (30 hrs presence + 20 hrs virtual) 100 hrs Self-study and project work 30 hrs Presentation and report preparation time

Recommended course requirements	Course program	Form of examination / Duration of examination	Teaching and learning methods	Responsible for the module
B.Sc. in Civil or Structural Engineering	Civil / Structural Engineering	80% Attendance 1 Group project presentation (oral) “...” (60%) / <u>SuSe</u> 1 Group project report: “...” (40%) / <u>SuSe</u>	Project (P, L)	Jun.-Prof. L. Abrahamczyk

Course aim

Civil/ Structural Engineering education is characterized by its fundamentals and broad subject orientation. On the other hand, there are the responsible tasks from practice where, real-life cases of damaging events by means of evidence-based and problem-based approach need to be understood and explained. This course aims not only to bridge existing gaps in the educational domain but also to equip students with advanced skills and practical knowledge applicable in real-world scenarios. The course emphasizes the importance of accurate data collection and thorough documentation as well as foster critical thinking and decision-making under complex circumstances. Forensic engineers must understand the legal framework within which they operate, especially in court cases. The course aims to develop a positive attitude and the right mindset to learn from failures, applying lessons from past failures to enhance safety and improve performance in engineering designs. Understanding the causes of structural failures is crucial for developing more resilient and safe structures.

Students will

- Learn how to describe structural damages/failure and application of technical and legal terminologies
- Learn to recognize scenarios/classification of structural damages/failures
- Learn to develop forensic engineering investigation strategy/plan
- Learn to apply and combine acquired technical knowledge to identify the causes of damages/failure
- Acquire skills in the identification of most probable structural damage/failure causes
- Gain knowledge in forensic engineering ethical and legal aspects
- Acquire competences in communication and reporting in legal environments
- Gain experience/proficiency/hands-on in damage/failure interpretation/problem solving skills.

Course content

Forensic Structural Engineering (L)

Timeline: April – June

Introduction to Forensic Structural Engineering (Terminology and Importance, Definition, Concept, Tracing evidence & proving theory); Aspects of the Legal Framework (Roles, EU comparison, Legal/Ethical Aspects); Building diagnostics, damage hypotheses, assessment of damage occurrence/overloads, construction errors, material defects, etc. within an evidence-based and problem-based and mostly holistic approach (Classification of failure; Inspection / Investigation / Identification; Analysis and validation methods, Modelling approaches, Accidental action, Probability/Reliability Analysis); Reporting (Systematic, detailing, Types of reports, Court reporting, Normative differences)

Forensic Reporting (P)

Students will work in groups á 3 students and will have to successfully complete at least two escape rooms. In preparation of the required group project report students will learn to write a systematic court report based on hands on exercise/ real-world example study addressing the following general topics: Derivation of the Tasks defined by the judge/client; Inspection; Comparison (structural sensitivity to details); Possible failure methods (case studies); Analysis and Assessment.

Course literature		
Publications and tutorials relevant for the project will be available on MOODLE.		

Courses		
Lecturer	Title of the course	Semester periods per week (SPW)
Jun.-Prof. Dr.-Ing. L. Abrahamczyk / ...	Forensic Structural Engineering (P, L)	2