

Course title: Forensic Investigation using Nondestructive Evaluation (NDE)

Lecturer: Prof. Norbert J. Delatte, M.R. Lohmann Endowed Professor of Engineering and the Head of the School of Civil and Environmental Engineering, Oklahoma State University, USA

Credits: 3 (24 hours of lectures)

Syllabus

A number of technologies are available for investigating damage and distress in structures. In many cases portable field equipment for nondestructive evaluation (NDE) has been developed to aid in forensic investigations. The methods rely on a variety of physics principles, such as ultrasonic waves, radar, and others. NDE methods have been developed for concrete, steel, masonry, and timber structures. However, appropriate use requires an understanding of the principles behind the methods and their limitations.

This course aims at providing fundamentals of physical principles behind commonly used NDE methods. Starting with understanding of deterioration mechanisms in different types of structures and materials, the course will move across several issues such as: how to plan forensic investigations using NDE equipment, capabilities and limitations of commercially available equipment, false positive and false negative results, and how to analyze and interpret data. NDE methods discussed will include visual inspection, rebound hammer, pullout, ultrasonic, ultrasonic pulse velocity, impact echo, ground penetrating radar, infrared, and others.

Course Schedule

Monday 17 March	Introduction, background and theories behind NDE methods
Tuesday 18 March	Visual inspection, planning investigations
Wednesday 19 March	Steel Structures, Pipes, etc.
Thursday 20 March	Concrete strength prediction
Monday 24 March	NDE of concrete structures, reinforcing steel location and condition
Tuesday 25 March	Ground penetrating radar
Wednesday 26 March	Other methods
Thursday 27 March	Latest considerations and exam*

Assessment methods

Oral exam with discussion of papers and design/assessment case studies. Exam is mandatory for PhD students who need certification for credits.

Attendee requirements

Fundamentals of Structural Analysis and Design; Fundamentals of Probability and Statistics.

References

Papers and guidelines provided by the teacher, including reports from ACI International and ASTM standards.