

# STRUCTURAL INTEGRITY AND NON-DESTRUCTIVE TESTING (NDT) ENGINEER / SPECIALIST



## BASIC DATA

Department: Department of Mechanical Engineering, Faculty of Engineering, UD

Program length: 2 semesters, Credits total: 60

Mode of attendance: part-time, 6x2 days per semester (Friday and Saturday)

Detailed description (in Hungarian): [program description](#)

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## INTRODUCTION

The ultimate development of micro- and nanoelectronics, computer technology, information technology has opened up areas that have to be strategically reconsidered almost every decade. One of these areas is the assessment of the safety of our operating engineering structures. They are designed for a service life of 30-50 years, based on the knowledge, production technologies and quality control practices of 40-60 years ago.

Structural defects can occur and grow in our aging structures, the material itself ages and certain fields (temperature, stress, deformation, etc.) arise during the operation. The economic significance of the training can be assessed directly. Just think about extending the operating time of the nuclear reactor blocks, extending the usability of bridges, halls, transit oil and gas pipelines, etc.). 45% of the knowledge provided as part of the training is for new, modern, non-destructive tests supported by microelectronics and their reliability, 35% is for understanding the aging of materials and evaluating defects, while 20% is for the methods of numerical simulation of fields and machine learning is related to the topic. The current knowledge acquired during the training can be applied in all fields of industry, including the vehicle, machine and plastic industries.

The lecturers participating in the training also established the conditions for starting the structural integrity and non-destructive engineer/specialist continuing education course in the field of research, and we want to ensure the transfer of high-level practical knowledge by involving the leading engineers of the industrial partners of the Faculty of Engineering of the University of Debrecen with the support of the Hungarian Non-Destructive Testing Association, Academia NDT International.

## SUBJECTS

Semester 1	Semester 2
Statistical methods	Machine learning
Introduction to finite-element method (FEM)	Structural integrity analysis with FEM
Engineering methods of operation	Material damages II.
Fracture mechanics	Modern condition monitoring
Material damages I.	Industry 4.0 and non-destructive testing methods
Safety, reliability, risk	Reliability of non-destructive testing methods
Non-destructive testing methods I.	Simulation of non-destructive testing methods
	Non-destructive testing methods II.
	Thesis

## LABORATORIAL BACKGROUND

Metallographic Laboratory, Engineering Diagnostics Laboratory, Material Testing Laboratories, Environmental Simulation Laboratory, CAD and CAE Laboratory