

ETE807 - Nondestructive Testing

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETE807	SEMESTER	6
COURSE TITLE	Nondestructive testing		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
Lectures / Labs / Tutorials	3	3	
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialized general knowledge, skills development</i>	Specialized general knowledge		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	http://mss-nde.uoi.gr/greek/414%20-%20ETE%20807/index.html		

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course is a compulsory specialized general knowledge course of the mechanics branch. The subject matter of the course aims at introducing the students to the basic concepts of nondestructive testing methods of materials and structures.

Upon successful completion of the course, the student will be able to:

- Know the basic methods for nondestructive materials testing (penetrating liquids, magnetic particles, eddy currents, ultrasound, acoustic emission, radiography, infrared thermography, optical detection).
- Understand the advantages and disadvantages of each method.
- Familiarize with the applications of these methods.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
Working in an international environment	Production of free, creative and inductive thinking
Working in an interdisciplinary environment
Production of new research ideas	Others...

- Autonomous Work
- Teamwork
- Work in interdisciplinary environment

(3) SYLLABUS

Introduction: Sources of errors. Nondestructive testing methods. Advantages. Penetrating fluids: Basic principles. Characteristics of penetrating fluids. Types of penetration systems. Advantages and disadvantages. Applications.

Magnetic particles: Magnetation. Methods of magnetation. De-magnetation. Magnetic particles. Advantages and disadvantages, applications.

Eddy currents: Principles of testing using eddy currents. Conductivity, magnetic properties, impedance. Characteristics of eddy current testing. Types of detectors. Types of circuits. Presentation of results. Applications.

Ultrasound: Characteristics of ultrasound. Types of ultrasonic waves. Generation of ultrasonic waves. Ultrasonic waves at interfaces. Attenuation. Ultrasonic transducers and devices. Testing methods. Detection of defects. Calibration of ultrasonic devices. Applications.

Radiography: Principles. Radiation sources. Radiation absorption. Radiographic characteristics. Types of radiography. Interpretation of radiograms. Safety issues and protection.

Other nondestructive methods: Infrared thermography (basic principles, types of thermographic inspection, applications). Visual inspection. Acoustic emission.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	In class lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>		
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of</i>	Activity	Semester workload
	Lectures	26
	Laboratory exercises	13
	Self-study	18
	Final exam preparation	18

<i>the ECTS</i>		
	Course total	75
<p>STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>LANGUAGE OF EVALUATION: Greek</p> <p>METHOD OF EVALUATION:</p> <p>(i) Final written examination with multiple choice questions</p> <p>(ii) Comparative evaluation of elements of the theory</p> <p>(iii) Project</p>	

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- T.E. Matikas, D. Aggelis, Nondestructive Testing, Electronic Publication, 1st Edition, Kallipos Digital Publishing, 2015.
- N. Megos, Radiologic technology: classic, Axial, nuclear magnetic, bone mineral density, Telemedicine, Ultrasound, G. Parikos EE Publications, 1996.

-Related academic journals: