a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM208E01	*Semester*	8
Course title	**Engineering failure analysis**		
Independent teaching activities		*Weekly teaching hours*	*ECTS*
Lectures		2	4.0
Laboratory exercises		2	
Course type		Special background	
Course category		Compulsory Elective for Direction 2	
Prerequisite courses		-	
Language of instruction and examinations		Greek	
Is the course offered to Erasmus students		Yes	
Course website (url)		https://eclass.uniwa.gr/courses/MECH129/	

b) Learning outcomes and general competences

b1. Learning outcomes

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

- Distinguish terminology related to the efficiency of an engineering assembly such as life span, service life, failures attributed to material or to design causes
- Describes the main stages of the life span of a part (design, construction, operation)
- Recognizes components' failure modes
- Categorizes the available methodologies to carry out a failure analysis procedure
- Understands the basic principles related to fractured surfaces
- Compose a failure analysis technical report including corrective actions

b2. General competences

- Search for, analysis and synthesis of data and information with the use of the necessary technology
- Adaptation in different circumstances
- Autonomous work
- Decision making
- Team work
- Design and assessment of a failure analysis procedure
- Ability to critize and self- criticism

c) Syllabus

Introduction to failure analysis, life span and service life of an engineering part, scope and procedure of a failure investigation, failure mechanisms, failure modes, means and techniques used in order to carry out a failure investigation, tools for identifying a failure mechanism, nondestructive testing, fracture mechanics, fractographic examination, optical and electronic analysis of microstructure, fatigue, mechanical testing, chemical analysis test, working conditions simulation tests, environmental degradation of materials, corrosion, erosion, hydrogen embrittlement, results and discussion of a failure investigation, recommendations, analysis report, case studies.

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face, Distance learning, etc.	
Use of information and communications technology	- Commercial/free/open source software - Multimedia applications - MS Teams/Moodle/eclass - Open courses	
Teaching methods	*Activity*	*Semester workload*
	Lectures	26
	Tutorials	-
	Laboratory exercises	26
	Computational exercises	-
	Individual work	50
	Course total	102
Student performance evaluation	- Theory (50%): written final exam - Lab (50%): technical reports in teams and presentation per exercise as well as per case study.	

e) Suggested bibliography

1. Becker W.T., Shipley R.J. (2002). *Failure Analysis and Prevention*. ASM Handbook Vol. 11, Ohio, ASM.
2. Callister D. W. Jr., Rethwisch G. D. (2014). *Materials science and engineering*, 8th Ed., John Wiley & Sons, Inc.,USA.
3. Wulpi D. (2000). *Understanding how components fail* , 2nd Ed., Ohio, ASM.