ΠΑΝΕΠΙΣΤΗΜΙΟ
ΔΥΤΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ

Α9. Περιγράμματα Μαθημάτων ΜΠΣ

ΜΟΔΙΠ
ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΗΣ ΠΟΙΟΤΗΤΑΣ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΔΥΤΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ

ΠΑΝΕΠΙΣΤΗΜΙΟ ΔΥΤΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ
UNIVERSITY OF WESTERN MACEDONIA

MSc Welding Engineering & NDI
Mech Eng_UoWM

ΠΕΡΙΓΡΑΜΜΑΤΑ ΜΑΘΗΜΑΤΩΝ

ΠΡΟΓΡΑΜΜΑΤΟΣ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ

ΜΗΧΑΝΙΚΗ ΣΥΓΚΟΛΛΗΣΕΩΝ ΚΑΙ ΜΗ ΚΑΤΑΣΤΡΟΦΙΚΟΣ ΕΛΕΓΧΟΣ

(MSc in Welding Engineering and Non-Destructive Inspection)

Κοζάνη, Ιούλιος 2025

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A Semester

Course Outline: Welding Technology Introduction

1. GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Mechanical Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE		**SEMESTER**	1^{o}
COURSE TITLE	**Welding Technology Introduction**		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Coursework, Coursework presentation		4	7
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA		
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek / English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

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*

Upon successful completion of the course, the students will be able to:
Have knowledge of the most important welding methods and their operating principles, the principles of the electric arc, the most important elements of welding metallurgy, the special characteristics and peculiarities of the welding requirements of the most important metals as well as their welding techniques, the welding power sources and the most important elements of auxiliary equipment and welding consumables.

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
Adapting to new situations
Decision-making
Working independently
Team work
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism

Working in an international environment *Working in an interdisciplinary environment* *Production of new research ideas*	*Production of free, creative and inductive thinking* *……* *Others…* *…….*

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

- Have theoretical background regarding the subject of Welding Technology
- They can appropriately apply the theoretical and practical knowledge acquired while attending the course.
- They can creatively utilize scientific knowledge to understand and solve industrial problems in the metal sector, as well as to promote innovation in the design and development of new metal products.

3. SYLLABUS

General introduction to welding technology, Flame welding and related processes, Electrotechnology, Arc welding machines, Introduction to gas shielded arc welding, Structure and properties of metals, Phases and diagrams for iron-carbon alloys, Production and classification of steels, Behavior of structural steels in fusion welding, Cracks in weld metal, Heat treatment of base metals and weld metals.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Teaching using supervisory tools. Learning process support through the electronic platform Moodle
TEACHING METHODS *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 the ECTS*	

Activity	***Semester workload***
Lectures	75
Practical exercises focusing on the application of methodologies and analysis of case studies	60
Independent Study	40
Total Course (25 hours of workload per credit unit)	175

STUDENT PERFORMANCE EVALUATION *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* *Specifically defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written final exam including: - Multiple choice questions - Essay questions II. Written assignment and PowerPoint presentation

5. ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

1. Science and Technology of Welding, Pantelis I. Dimitris – Papazoglou I. Vasilis – Chaidemenopoulos Grigoris, Tziolas 2017.
2. Introduction to Welding, Chaidemenopoulos Grigoris, Tziolas 2023.
3. Teaching Notes of the UOWM Scientific Team

Course Outline: Introduction into Non-Destructive Testing (NDT)

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	1°
COURSE TITLE	Introduction to Non-Destructive Testing (NDT)		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Coursework		4	8
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA		
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/ English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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*

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

1. understand and categorize discontinuities,

2. understand and implement the principles of all NDT 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 *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

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

- Have the theoretical background regarding the subject of Welding Technology
- Appropriately apply their theoretical and practical knowledge acquired while attending the course.
- Have the ability to creatively utilize scientific knowledge to understand and solve industry problems in the metal sector, as well as to promote innovation in the design and development of new metal products.

(3) SYLLABUS

Introduction to all Non-Destructive Methods, to discontinuities developed during welding and casting. Quality Assurance and Quality Control, NDT management, Codes and standards and how to submit them.
Introduction to Non-Destructive Testing.
Presentation of failures and destruction of mechanical structures.
Reliability of NDT. Overview of NDT methods.
Optical Inspection: Microscopes. Surface replication. Endoscopes. Penetrating liquids. Magnetic particles.
Electrical methods: Eddy currents.
Acoustic and ultrasonic methods: Elements of wave propagation in infinite and finite elastic solid media.
Change in the propagation mode of elastic waves at free boundaries and interfaces.
Critical propagation angles. Ultrasonic testing, Equipment, Piezoelectric
sensors. Attenuation, scattering, dispersion, ultrasonic testing devices. Evaluation of cracks and defects in general. Acoustic Emission. AE signal analysis, AU acoustic-ultrasonics.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Teaching using supervisory tools. Learning process support through the electronic platform Moodle
TEACHING METHODS *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 the ECTS*	

Activity	***Semester workload***
Lectures	80
Practical exercises focusing on the application of methodologies and analysis of case studies	60
Assignment Writing	40
Total Course (25 hours of workload per credit unit)	200

STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written final exam including: - Multiple choice questions - Essay questions II. Written assignment

(5) ATTACHED BIBLIOGRAPHY

1. Nondestructive Testing (NDT), Giuseppe Lasidogna, Applied Sciences 2021

2. Teaching Notes of the UOWM NDT Scientific Team

Cource Outline: Welding Laboratory Practice

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	1ο
COURSE TITLE	Welding Laboratory – Practice		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
Διαλέξεις, Εκπόνηση εργασίας μαθήματος, Παρουσίαση εργασίας μαθήματος	1	8
Εργαστήριο	4	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el

(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*

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

-Select the correct welding method with MMA, MIG, TIG Oxygen, etc.

-Supervise technical personnel in the manufacture of welded pipes and metal materials.

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…*
	…….

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

- Have the theoretical background regarding the subject of Welding Technology
- Appropriately apply their theoretical and practical knowledge acquired while attending the course.
- Have the ability to creatively utilize scientific knowledge to understand and solve industry problems in the metal sector, as well as to promote innovation in the design and development of new metal products.

(3) SYLLABUS

Practical training in various welding methods

(4) EACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Learning process support through the Moodle electronic platform
TEACHING METHODS *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*	

Activity	***Semester workload***
Lectures	50
Laboratory Exercises	75
Thesis Writing	15

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 the ECTS*	Field Trip	15
	Independent Study	20
	Total Course (25 hours of workload per credit unit)	***175***
STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Laboratory exercise	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Metallurgy, Georgios K. Triantafyllidis

2. Metallurgy for Engineers, E.C. Rollason, Edward Arnold

3. Teaching Notes of the Scientific Group of the MDM

4. Science and Technology of Materials, Vatalis Argyris S.

5. Technical Mechanics, Strength of Materials P.A. Vouthounis

Course Outline: Materials I

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	1°
COURSE TITLE	Materials I		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures		5	7
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA		
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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*

UPON SUCCESSFUL COMPLETION OF THE COURSE, THE STUDENTS WILL BE ABLE TO:

• Have sufficient knowledge of the structure of metals and alloys of mechanical constructions, tools, devices, molds, machine elements, coatings, welds.

• Will understand the relationship between structure and behavior (properties) and the methods of intervention in the structure (thermal, mechanical and other treatments and processes).

• Will have the ability to select appropriate materials using international standards, specifications, regulations and codes of practice and will be able to determine the properties of materials with their various measurement methods (testing).

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 *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

Upon successful completion of the program, students will:
- have the theoretical and practical background regarding the field of knowledge of Materials
-be able to appropriately apply their theoretical and practical knowledge
- have the ability to creatively utilize scientific knowledge and modern technology for understanding and solving problems in industrial operations, as well as promoting innovation in the design and development of new products and services in Greece and internationally.

(3) SYLLABUS

- Structural (non-alloy) steels,
- High strength steels,
- Application of structural and high strength steels,
- Creep and creep resistant steels, Steels for cryogenic applications,
- Stainless and heat-resistant steels,
- Cast irons,
- Destructive testing of materials and welded joints.
- Introduction to wear and protective layers
- Introduction to corrosion

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Distance learning Learning process support through the Moodle electronic platform
TEACHING METHODS *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 the ECTS*	
STUDENT PERFORMANCE EVALUATION *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. Written final exam including: - Multiple choice questions - Developmental questions II. Written assignment.

Activity	***Semester workload***
Lectures	75
Laboratory Exercises	70
Thesis Writing	20
Independent Study	10
Course total	***175***

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
1. Metallurgy, Georgios K. Triantafyllidis.
2. Metallurgy for Engineers, E.C. Rollason, Edward Arnold.
3. Teaching Notes Scientific Team of the MDM.
4. Science and Technology of Materials, Vatalis Argyris S.
5. Materials and their Behavior during Welding (MODULE 2), Diamantopoulos Konstantinos WGI 2018.

Course Outline: Quality Control & Health and Safety

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	1o
COURSE TITLE	Quality Control & Health and Safety		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures		3	7
Exercises / Demonstration of the use of computer programs for solving exercises		2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA / SKILLS DEVELOPMENT		
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the courses.		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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*

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

- Apply quality control tools in order to identify the causes of "bad" quality.
- Interpret the results of the application of control charts in the production process.
- Apply computer programs (Data analysis, Minitab) for data analysis, and interpret the results of statistical inference.
- Selects optimal value levels of factors that affect the process.

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

- Understands the basic principles of Health and Safety at work.
- Recognizes the main occupational hazards and preventive protection measures.
- Implements safe work practices in industrial environments.
- Knows the legislative and regulatory requirements for Health and Safety at work.
- Analyzes the specific risks and protective measures in welding processes.
- Implements risk control and management procedures in welding.

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

Upon completion of the course, the students will have developed:

- Ability to recognize the usefulness of control charts.
- Ability to select the appropriate control chart depending on the quality characteristic.
- Skills in recognizing the significance of statistical experiments.
- Ability to recognize and assess risks in the workplace.
- Critical thinking and decision-making skills to prevent occupational accidents.
- Skills in applying safety rules in industrial processes.
- Ability to collaborate and communicate on Health and Safety issues.
- Ability to use modern methods and tools for managing occupational risks.
- Development of responsibility and professional ethics in the implementation of safety measures.

(3) SYLLABUS

Basic quality concepts in production process control
- production process capability analysis
- sorting characteristic control charts
- measurement characteristic control charts

Introduction to the design and analysis of statistical experiments
- Analysis of single-factor experiments
- Design and analysis of multi-factor experiments, factorial Experiments

Introduction to Health and Safety at Work
- Basic Principles of Health and Safety
- Legislation and Regulatory Requirements
- Obligations of Employers and Employees

Occupational Hazard Analysis and Prevention Measures
- Physical, Chemical, Biological and Ergonomic Hazards
- Risk Assessment and Management Methods
- Personal Protective Equipment (PPE) and Safety Measures

Modern practices and technologies in Health and Safety
- Digital tools for safety management
- Incident analysis and accident investigation
- Safe work policies and safety culture

Health and Safety in Welding Processes
- Hazards from Gases, Fumes and Radiation

- Safe Welding Practices
- Ventilation and Worker Protection Methods

Emergency Management and First Aid

- Emergency Plans
- Fire and Hazardous Materials Management
- First Aid in a Welding Environment

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Learning process support through the Moodle electronic platform
TEACHING METHODS *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 the ECTS*	

Activity	***Semester workload***
Lectures	75
Practical exercises focusing on the application of methodologies using data analysis programs	70
Thesis Writing	20
Independent Study	10
Course total	***175***

STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written final exam • Multiple choice questions • Essay questions • Problem solving II. Written assignment

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:

- Teaching Notes Scientific Group of the MDM.
- Tagaras, G.N. "Statistical Quality Control", Ziti Publications, Thessaloniki, 2001.
- Notes ELINYAE – Hellenic Institute of Occupational Health and Safety (Available at www.elinyae.gr)
- Directive 89/391/EEC on the Safety and Health of Workers.
- Greek Legislation on Occupational Health and Safety (Law 3850/2010).

B Semester

Course Outline: Welded Constructions

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	2^{o}
COURSE TITLE	Welded Constructions		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Thesis, Thesis Presentation		12	8
Laboratory		-	-
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific Area		
PREREQUISITE COURSES:	To understand the courses, students are not required to have prior knowledge.		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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*
Upon successful completion of the course, the student will be able to: • Understand the basic principles of welded structure design and select appropriate welding methods depending on the application requirements. • Calculate the strength of welded joints and assess the behavior of welds structures under static and dynamic loads. • Design and analyze structural welded structures (e.g. frames, tanks, components) applying theories of material strength and structural systems theory. • Develop mechanical designs of welded structures using CAD software. • Design sheet metal components and structures and manage parts lists and cutting accounting data.

• Implement standards and codes for the design of welded structures and ensure compliance with international standards (e.g. EN, ISO, ASME).
• Evaluate the influence of metallurgical characteristics and thermal deformations on the design and performance of welded structures.

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…*
	…….

Upon successful completion of the course, the student will be able to:
• Has the theoretical and practical background regarding the subject of design and analysis of welded structures.
• Is able to appropriately apply theoretical knowledge of mechanics, strength of materials and welding technology for the calculation, design and optimization of welded structures.
• Develops skills in searching, analyzing and synthesizing data using modern design and simulation technologies (CAD, FEM).
• Is able to work independently or in teams designing welded structures in an interdisciplinary and international environment.
• Critically and creatively utilizes scientific knowledge to solve complex technical problems and develop innovative welded products and solutions.
• Demonstrates responsibility and professional ethics in the design and evaluation of structural welded systems, with respect for the natural and social environment.
• Applies critical and self-critical thinking in the technical decision-making process.
• Contributes to the promotion of free, creative and inductive thinking within the context of mechanical design and technological development.

(3) SYLLABUS

• Basic principles of design and analysis of welded structures.
• Basic theory of structural systems and applications to welded structures.
• Fundamental concepts of material strength and their application to welding.
• Welding materials: selection, characteristics and behavior in welding.
• Types and forms of welds: weld geometry and joint strength calculation.
• Configurations of welded components and structures.
• Symbolic and schematic representation of welds in mechanical drawings (according to ISO and AWS standards).
• Design of welded structures in a CAD environment (components, assemblies, assemblies).
• Development and design of sheet metal structures using CAD software.
• Management of parts lists, cutting lists and costing of welded structures.
• Behavior of welded structures under static and dynamic loads.
• Special welded structures: design of pressure vessels and welded frames made of aluminum alloys.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Learning process support through the Moodle electronic platform
TEACHING METHODS *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 the ECTS*	
STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written final examination

Activity	***Semester workload***
Lectures	80
Practical exercises focusing on the application of methodologies and analysis of case studies in smaller groups of students	60
Thesis writing and presentation	40
Independent Study	20
Course total	***200***

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

• Teaching Notes of the Scientific Group of the MDM

• Welding Science and Technology, Book Code in Eudoxus: 59397384, Edition: 1st/2017, Authors: Pantelis D.I., Papazoglou V.I., Chaidemenopoulos G.N., ISBN: 9789604186587, Publisher: A. TZIOLA & SONS PUBLICATIONS S.A.

• Metallurgy, 3rd Edition, Book Code in Eudoxus: 59397354, Edition: 3/2016, Authors: Traiantafyllidis K., ISBN: 9789604185955, Publisher: A. TZIOLA & SONS PUBLICATIONS S.A.

• TECHNICAL MECHANICS, Book Code in Eudoxus: 86054827, Edition: 10/2019, Authors: VOUTHOUNIS PANAGIOTIS, ISBN: 9786188328044, Publisher: VOUTHOUNI ANDROMACHI

Course Outline: Welding, Cutting and Surfacing Processes

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	2ο
COURSE TITLE	Welding, Cutting and Surfacing Processes		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Coursework		5	8
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA		
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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*

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

-Select the appropriate metal materials, steels, aluminum alloys and cast iron for welding structures of all types

-Be able to design metal structures

-Decide on the correct welding method

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

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

- Have theoretical background regarding the subject of Welding Technology
- Apply their theoretical and practical knowledge acquired while attending the course.
- Creatively utilize scientific knowledge to understand and solve industry problems in the metal sector, as well as to promote innovation in the design and development of new metal products.

(3) SYLLABUS

TIG welding, MIG/MAG and Flux cored welding, MMA welding, Submerged-arc welding, Resistance Welding, Electrochemical Processes (LB, EB, PW, etc.), Cutting and other surface edge preparation processes, Brazing, Welding & advanced materials.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Teaching using supervisory tools. Learning process support through the electronic platform Moodle
TEACHING METHODS *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 the ECTS*	

Activity	***Semester workload***
Lectures	40
Practical exercises focusing on the application of methodologies and analysis of case studies in smaller groups of students	50
Thesis writing and presentation	40
Independent Study	20
Course total	***150***

STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written final exam including: - Multiple choice questions - Essay questions - II. Written assignment and PowerPoint presentation

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Science and Technology of Welding, Pantelis I. Dimitris – Papazoglou I. Vasilis – Chaidemenopoulos Grigoris, Tziolas 2017.
2. Introduction to Welding, Chaidemenopoulos Grigoris, Tziolas 2023.
3. Teaching Notes of the PDM Scientific Team

Course Outline: Non-Destructive Methods

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	2ο
COURSE TITLE	NON-DESTRUCTIVE METHODS		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Coursework, Coursework presentation	3	7
Laboratory	2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el

(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*

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

- understand and implement the principles of all NCEs.
- test metallic specimens with all NCEs.
- prepares a technical report (regarding the testing of the samples).
- detects internal or external defects in materials,
- determines the structure, composition or properties (elastic constants, hardness) of metals
- understands and categorizes discontinuities.

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…* *…….*

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

- Have the theoretical background regarding the subject of Non-Destructive Testing of Materials & Structures
- Appropriately apply their theoretical and practical knowledge acquired while attending the course.
- Creatively utilize scientific knowledge to understand and solve industry problems in the metal sector, as well as to promote innovation in the design and development of new metal products.

(3) SYLLABUS

The course focuses on the physical and mechanical principles of non-destructive testing. It covers an introduction to the theoretical background of each method. This is followed by an analysis of the physical phenomena on which the operation of each method is based. All modern methods are presented in the category.
LABORATORY: Inspection of Defects of Objects with all methods for which the laboratory has equipment.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Teaching using supervisory tools. Learning process support through the electronic platform Moodle
TEACHING METHODS *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 the ECTS*	
STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written final examination including: - Multiple choice questions - Questions II. Written assignment

Activity	***Semester workload***
Lectures	40
Laboratory Exercises	60
Thesis Writing	40
Independent Study	10
Course total	***150***

(5) ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

1. Teaching Notes of the MDE Scientific Group of the MDM
2. Non Destructive Testing, Giuseppe Lacidogna, Applied Sciences 2021

Course Outline: Materials II

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	2ο
COURSE TITLE	Materials II		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Thesis, Thesis Presentation		2	7
Laboratory		2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA		
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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*

Upon successful completion of the course, the student will:

• Have sufficient knowledge of the structure of metals and alloys
of mechanical constructions, tools, devices, molds, machine elements,
coatings, welds.
He will understand the relationship between structure and behavior (properties) and the methods of intervention in the structure (thermal, mechanical and other treatments and processes).
Will have the ability to select appropriate materials using international standards, specifications, regulations and codes of practice and will be able to determine the properties of materials with their various measurement methods (testing). • Will have the ability to select the appropriate method of producing objects by casting, welding and forming processes.

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…*
	…….

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

- Have a theoretical and practical background concerning the cognitive field of Metallurgy.
- They are able to appropriately apply their theoretical and practical knowledge acquired while attending the course.
- They can creatively utilize scientific knowledge to understand and solve industry problems in the metal sector, as well as to promote innovation in the design and development of new metal products.

(3) SYLLABUS

Copper and copper alloys, nickel and nickel alloys, Aluminum and aluminum alloys, titanium and other metals and alloys that join dissimilar materials, welding laboratories.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Learning process support through the Moodle electronic platform
TEACHING METHODS *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 the ECTS*	
STUDENT PERFORMANCE EVALUATION *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. Written final exam II. Written assignment

Activity	***Semester workload***
Lectures	40
Practical exercises focusing on the application of methodologies	50
Writing the paper and presentation	40
Independent study	20
Course total	***150***

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Metallurgy, Georgios K. Triantafyllidis.
2. Metallurgy for Engineers, E.C. Rollason, Edward Arnold.
3. Teaching Notes Scientific Team of the MDM.
4. Science and Technology of Materials, Vatalis Argyris S.
5. Materials and their Behavior during Welding (MODULE 2), Diamantopoulos Konstantinos WGI 2018.

Course Outline: Research Methods – Case Study

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	2o
COURSE TITLE	Research Methods - Case Studies		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Coursework, Coursework presentation	4	7
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SCIENTIFIC AREA
PREREQUISITE COURSES:	Students are not required to have prior knowledge to understand the course
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek/English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el

(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*

Upon successful completion of the course, the student will be able to:
know the work instructions or code requirements for the execution of welds in high quality constructions, to know the procedures for selecting welding methods depending on the requirements of the construction, to calculate the cost and the productivity rate, as well as to be capable of fully recording the processes of a welded construction, after completing the necessary checks.

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…*

…….
Upon successful completion of the course, the student will be able to: ➢ Prepares written documents describing welding procedures ➢ Is able to provide instructions to the welder or operators. ➢ It effectively contributes to the realization of high-quality welds in accordance with the requirements of the code.

(3) SYLLABUS

• Quality assurance in welded structures • Specifications and certification of welding processes, welding technicians and assembly technicians • Control measurement and recording • Cost and productivity in welding • Repair and maintenance using welding

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Learning process support through the Moodle electronic platform
TEACHING METHODS *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 the ECTS*	***Activity*** / ***Semester workload*** Lectures: 60 Practice Exercises: 80 Thesis Writing: 20 Independent Study: 10 Course total: ***175***
STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Written assignment – Case study (100%)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Concept and case study WPQR WELDING PROCEDURE QUALIFICATION IN ppap, Fulbodh Chaudhary, 2016.
2. Teaching Notes UOWM Scientific Team

C Semester

Postgraduate Thesis

(1) GENERAL

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF MECHANICAL ENGINEERING		
LEVEL OF STUDIES	Master's degree		
COURSE CODE		**SEMESTER**	**3**
COURSE TITLE	Master's Thesis		
INDEPENDENT TEACHING ACTIVITIES *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*		**WEEKLY TEACHING HOURS**	**CREDITS**
			30
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	SPECIALIZATION		
PREREQUISITE COURSES:	THE COURSES OF THE FIRST AND SECOND SEMESTER		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek / English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://weld-ndt.uowm.gr/index.php?lang=el		

(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 purpose of preparing the master's Thesis is to synthesize knowledge on a specific topic related to the subjects of the master's degree, through a scientific and systematic approach. Through the process of preparing for the DME, postgraduate students further develop their critical thinking, as they carefully study a specific topic, but also apply the knowledge gained in practice.

Specifically, the objectives of the DME are:
A. The specialization of the postgraduate student in selected fields of knowledge
B. The deepening of postgraduate students in research thinking and methodology, through comprehensive study and in-depth investigation of a distinct topic, and
C. The application of knowledge acquired during the courses of the two previous semesters.

Upon successful completion of the MDE, postgraduate students will be able to:
• Understand a scientific topic in depth
• Clearly recognize the boundaries of the topic to be examined and studied and recognize all its aspects
• Describe and document knowledge related to the subject to be studied

• Select the required bibliography
• Use methodological practices and tools to analyze the topic
• Select and plan the theoretical and research approach to the topic that they will develop
• They present critical and original thinking
• They draw scientific conclusions
• They summarize existing knowledge and synthesize it with their own findings
• They develop the learning elements they have and prepare themselves for the continuation of their studies

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…*
	…….

• Search, analysis and synthesis of data and information, using the necessary technologies
• Adapt to new situations
• Decision making
• Autonomous work
• Promotion of free, creative and inductive thinking
• Generation of new innovative ideas
• Project planning and management

(3) SYLLABUS

The main purpose of the master's Thesis is to address and resolve, at a theoretical and applied level, issues that are part of the subjects of the Master's Degree, synthesizing and utilizing the knowledge acquired in the previous two semesters of study.
Through the thesis, postgraduate students are invited to acquire the ability to manage complex problems related to the scientific field of Welding Engineering and Non-Destructive Testing, or to implement an idea in this field.
It is a comprehensive work of considerable importance with distinct stages.
At the same time, postgraduate students should be able to clearly present the study, research and implementation through an extensive scientific written text and through a full presentation.
The MDE may belong to the following categories:
• Research / Theoretical, where the focus is on the extension of studied phenomena with potential applications in their resolution
• Application (project), glass where the focus is on the development of a new application in a field of interest using one or more software packages or tools.

The preparation of the MDE is important and burdensome. In this context, engagement in issues that are at the cutting edge of science, possess originality and research interest is encouraged.
The stages of preparing the MDE can be summarized as follows:
• description and analysis of the topic
• analysis of the current situation and literature review
• Definition of the research field (research questions or research hypotheses, objectives and perspectives)
• description of the methodology and research tools used to carry out the work
• data collection and implementation
• results from the selected form of analysis (statistics, content analysis, practical application)

- conclusions arising from the results of the research, in combination with the prevailing theories
- writing a text
- creating a presentation (PowerPoint)

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of all technologies required for communication between student and supervising professor
TEACHING METHODS *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 the ECTS*	***Activity*** | ***Semester workload*** Preparation of the Master's Thesis | 25 hours of workload Course total |
STUDENT PERFORMANCE EVALUATION *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Public presentation and examination of the Master's Thesis before a three-member examination committee in which the supervising professor participates. The evaluation and grading criteria of the DME include: • organization and planning • technical and theoretical understanding • results, interpretation, discussion, conclusions • presentation

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:

- Bibliography relevant to the subject of study of the DME