



FREDERICK UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING

Master Thesis Preparation

**«MSc in MANUFACTURING AND WELDING
ENGINEERING DESIGN»**

- MDME516 - Research Preparation and Proposal (7 ECTS)
- MDME517 - Graduate Research (13 ECTS)
- MDME518 - Thesis Writing and Presentation (10 ECTS)

General Objectives

The aim of this MSc programme is to provide advanced knowledge and scientific background.

- Advanced engineering industry processes.
- Computational modelling techniques,
- Design and manufacturing
- Engineering practice
- Welding Processes

Solve mechanical engineering problems of varying complexity, taking into consideration the economic, social and environmental context.

Modern mechanical engineering design and production activities.

Two Specializations

1. Specialization in Manufacturing Engineering Design

Specialization in Manufacturing Engineering Design include courses which are designed to provide advanced competencies in the areas of computer-aided manufacturing, computer-aided design and analysis, and integrated processing of various materials. It is designed for decision-makers in manufacturing engineering, engineering graphics and design, process engineering, quality assurance, and tooling design.

2. Specialization in Welding Engineering Design

Specialization in Welding Engineering Design will provide graduates with a fundamental understanding of welding technologies and an awareness of recent technical developments within the relevant industries. It will also improve communication, presentation, analytical and problem solving skills. Our graduates will obtain high level education gain in advanced welding and joining technologies, thus be able to attain positions of significant engineering responsibility

A/A	Course Type*	Course Code	Course Title	ECTS
1	Required	MDME501	Design and Manufacturing	7
2	Required	MDME502	Advanced CAD/CAM Systems	7
3	Required	MDME503	Advanced Materials and Applications	7
4	Required	MDME504	Graduate Seminars I	2
5	Required	MDME506	Design of Welded Structures	7
6	Spec Elect	MDMD505	Advanced Manufacturing processes	8
7	Spec Elect	MDMD510	Surface Engineering and Coatings	7
8	Spec Elect	MDMD512	Rapid Product Development	7
9	Spec Elect	MDMD513	Advanced Engineering Design	8
10	Spec Elect	MWED505	Welding Processes and Equipment	8
11	Spec Elect	MWED510	Welding Metallurgy and Weld Quality	8
12	Spec Elect	MWED512	Advanced Welding Processes	7
13	Spec Elect	MWED513	Welding Systems and Research Methods	7
14	Required	MDME 516	Research Preparation and Proposal	7
15	Required	MDME517	Graduate Research	13
16	Required	MDME518	Thesis Writing and Presentation	10

Year 1 - Semester 1

Course code/Title	ECTS	Hours
MDME 501 - Design and Manufacturing	7	3
MDME 502 - Advanced CAD/CAM Systems	7	3
MDME 503 - Advanced Materials and Applications	7	3
MDME 504 - Graduate Seminars I	2	-
MDME 506 - Design of Welded Structures	7	3
Total	30	

Year 1 - Semester 2
- (1) Specialization in Manufacturing Engineering Design

Course code/Title	ECTS	Hours
MDMD 505 - Advanced Manufacturing processes	8	3
MDMD 510 - Surface Engineering and Coatings	7	3
MDMD 512 - Rapid Product Development	7	3
MDMD 513 - Advanced Engineering Design	8	3
Total	30	

Year 1 - Semester 2
- (2)Specialization in Welding Engineering Design

Course code/Title	ECTS	Hours
MWED 505 - Welding Processes and Equipment	8	3
MWED 510 - Welding Metallurgy and Weld Quality	8	3
MWED 512 - Advanced Welding Processes	7	3
MWED 513 - Welding Systems and Research Methods	7	3
Total	30	

Year 1 - Semester 3

Course code/Title	ECTS	Hours
MDME 516 - Research Preparation and Proposal	7	-
MDME 517 - Graduate Research	13	-
MDME 518 - Thesis Writing and presentation	10	-
Total	30	

Manufacturing Technology and Engineering Design Laboratory (MTED)

The Manufacturing Technology and Engineering Design Unit aims to conduct high level of research in the field of manufacturing and engineering design of new and innovative products. Throughout various research projects the research team of the Center solved many problems of the local industry. The state of the art research facilities of the Center consist of various research equipment, devices and machines such as 5-axis high speed CNC vertical milling machine, rapid prototyping machine, fatigue tester, press machine, electronic microscope precision-controlled heat-treatment furnaces, materials characterization instruments, etc. Furthermore, the research team uses a number of CAD/CAM/CAE software packages such as LS-DYNA, DEFORM3D, ANSYS, COSMOS, Nastran etc. for making calculation, simulations and solid modeling.

Research Projects:

- Application of thin hard PVD, CVD and Thermal Spray coatings on machine elements (extrusion dies, cutting tools, hybrid bearings, cam mechanisms)
- Characterization and evaluation of the mechanical properties of hard and thin PVD, CVD and thermal spray coatings, fatigue prospect and determination of their working life under static or dynamic loads
- Design and development of computational procedures by means of Finite Elements Method (FEM Simulation)
- Manufacturing processes, CNC machine tools and CAD/CAM systems
- Reconstruction of Archaeological Findings by Computer Tomographies and Rapid Prototyping Methods
- Design and manufacturing of fiber-reinforced composite high-pressure pipes capable for corrosion liquids
- Bio-engineering, Spine simulation (FEM), Material Properties and Characterization

Laboratory of Computational Biomechanics (LCB)

The Laboratory of Computational Biomechanics was officially established as an independent and self-funded research entity in 2013. The teams' research activities however, precede its foundation by almost two years. Mainly focusing on Inverse Dynamics and Finite Element simulations of the Human Musculoskeletal system, the Laboratory of Computational Biomechanics rigorously publishes breakthroughs in related fields and internationally recognized journals. Members of the Laboratory participate both, in national and inter-European projects while having being awarded 4 scholarships and 2 awards in the last year only. During 2013, the team was nominated among the 3 finalist worldwide for the biannual «Clinical Biomechanics Award» of the International society of Biomechanics (ISB).

Research Projects:

- FEM supported determination of the biomechanical response of the human spine considering all musculo-skeletal characteristics, Acronym: BioSpine, Project ID: 3227, Greek Ministry of Education, Lifelong Learning and Religious Affairs, "Support of Postdoctoral Researchers", Sub filed: PE8 (Materials engineering, biomaterials, metals, ceramics, polymers, composites), Hellenic Host: Aristotle University of Thessaloniki, International Host: Frederick University, Budget 150.000, 2012-15
- "Optimizing the diagnostic value of SPECT myocardial perfusion images under the influence of respiratory motion", Βελτιστοποίηση της διαγνωστικής αξίας εξετάσεων αιμάτωσης μυοκαρδίου με υπολογιστική τομογραφία εκπομπής φωτονίων υπό την επίδραση της αναπνοής, Cyprus Research Promotion Foundation, ΥΓΕΙΑ/ΔΥΓΕΙΑ/0311(BIE)/27, Budget 180.000, 2012-14

Lecturers involved in the MSc program

MSc in Manufacturing and Welding Engineering Design

Specializations: a) Manufacturing Engineering Design, b) Welding Engineering Design

Dr. Antonios Lontos Associate Professor	Machine Elements and Analysis, Machine Elements and Analysis, Mechanical Engineering Design and Optimisation, Product Design and Development, Manufacturing Processes, Advanced manufacturing Processes
Dr. Stamatis Rossides Associate Professor	Engineering Drawing, Heat and Mass Transfer, Materials Science and Engineering, Tribology
Dr. Sotiris L. Omirou Associate Professor	Engineering Drawing, Computer Aided Design, Manufacturing Processes, Manufacturing Processes with the Aid of CAD/CAM Systems, Instrumentation and Data Acquisition Systems, Industrial Automation, Robotics, Production Systems and Automation
Dr. Loucas Papadakis Assistant Professor	Engineering Drawing, Dynamics, Strength of Materials and Structures, Mechanical Engineering Design, Finite Element Method in Structural Engineering, Advanced Manufacturing Processes, Composite Materials, Computational Mechanics Application
Dr. Christodoulos Christodoulou Professor	Alternative Sources of Energy, Chemistry of Hydrocarbons, Mass and Energy Balances, Industrial Processes, Materials Science and Engineering, Nanotechnology
Mr. Spyros Kallis	Welding Processes and Equipment, Welding Metallurgy and Weld Quality, Advanced Welding Processes, Welding Systems and Research Methods
Mr. Christos Kallis	Welding Processes and Equipment, Welding Metallurgy and Weld Quality, Advanced Welding Processes, Welding Systems and Research Methods

MSc Thesis titles (1/2)

- Design and construction of advanced machine elements and devices
- Characterization of thin hard coatings performance
- New Materials, Coatings and surface engineering
- Applications of thin hard coatings on machining or forming tools
- Application of PVD, CVD and thermal spray coatings on machine parts or elements
- Plastic dies and moulds
- Design of high Performance forming dies and moulds
- Industrial machining or forming applications and special tools
- Manufacturing processes with material removal
- CNC machine tools and CAD/CAM systems
- Manufacturing of complex geometries
- Computer-Aided Process Planning in the 5-Axis CNC Machine Environment
- Design and manufacturing, features, process selection, process parameters, work piece material, machine type, tool type and path, quality checks

MSc Thesis titles (2/2)

- Welding engineering simulation and quality testing
- Modeling, residual stresses and distortion due to welding
- Design of various parts for oil and gas industry
- Welding parameters and their effect on strength
- Welds in high strength steels
- FEM supported determination of the biomechanical response of the human spine
- Reconstruction of complex products by Computer Tomographies and Rapid Prototyping
- Design applications in human systems and special experimental procedures
- Quality in product design and development
- Machining or forming quality and cost reduction
- Quality improvement for manufacturing systems design and control
- Advanced models in engineering design

Laboratory Equipment

Fatigue Test Machine



Fatigue Test Machine



Automated hydraulic press

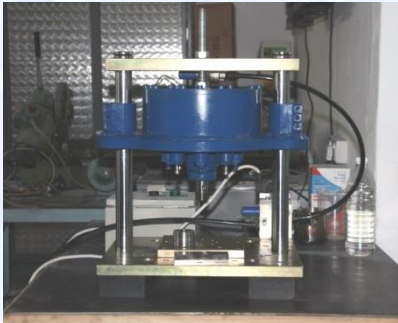


Tension – Compression Test Machine



Laboratory Equipment

Pneumatic Fatigue tester



Color rapid prototyping machine



Carbolite electric furnace



ELF 11/6

MIG-MAG, TIG and MMA welding machine



Laboratory Equipment

Hardness Testing Machine, MITUTOYO



Surtronic 25, Roughness measurement



Hardness Tester, Equotip 3



Optical and metallurgical microscopes



Universal amplifier MX840 and load cells



MDME516 - Research Preparation and Proposal

Learning outcomes of the course unit:	<ul style="list-style-type: none">• Perform literature searches and retrieve and analyze information.• Report and critically comment on published research and scientific work.• Propose and justify a methodology to be employed for the implementation of a Master's level Thesis.• Demonstrate competency in the methodologies needed for a successful research project proposal, planning, and implementation.• Employ written and oral communication skills. communicate effectively through a variety of media including oral, visual, written, diagrammatic and on-line
Course contents:	<p>This is the first of the three courses that constitute the Masters Thesis, which is a research oriented work at the forefront of knowledge within the specialization of the student.</p> <p>By the end of the course, the student must submit and present to his Assessment Committee a proposal for his Master's Thesis. In this proposal, the student is expected to propose the topic of his project, providing the detailed objectives and expected contributions of his work, give a complete literature review of the current state of knowledge on the issues related to the proposal, and suggest a methodology and planning for the implementation of the Thesis.</p>

MDME516 - Research Preparation and Proposal

Planned learning activities and teaching methods:	<p>At the beginning of the course, students must consult with the academic staff and decide on the topic of their Masters Thesis. After deciding on the topic of the Master Thesis, the Program Coordinator, in consultation with the student and other related members of the Department, form an Assessment Committee for the student, consisting of three members. Two of these members must be from the academic staff related to the specialization of the student, where one is the student's Thesis Advisor. The third member can be any member of the academic staff of the Program, or an external qualified person.</p> <p>The Student is expected to meet regularly with his Thesis Advisor to set the objectives and contributions of the Thesis, and decide on the methodology to be used.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> • Suitability and completeness of set objectives: 20% • Adequacy of sources consulted: 20% • Proposed methodology and planning: 20% • Quality of proposal report: 20% • Oral Presentation: 20%

MDME517 - Graduate Research

Learning outcomes of the course unit:

- Carry out investigation in the forefront of knowledge in the area related to topic of the student's Thesis.
- Demonstrate competency in the methodologies needed for a successful research project implementation.
- Employ analytical, modelling and experimental methodologies for the implementation of a research project.
- Use appropriate software and hardware tools to support the implementation and evaluation of a research project.
- Formulate appropriate assessment criteria, and evaluate the outcome of a research project.
- Draw conclusions on the investigations of a research project, and propose areas for improvements and future developments.

Course contents:

This is the second of the three courses that constitute the Masters Thesis, which is a research oriented work at the forefront of knowledge within the specialization of the student.

A student registered in this course is expected to implement the objectives of the Thesis, using the methodology proposed in the MME516 (Research Preparation and Proposal) course, according to the approved planning. For a typical full time student, this course is taken concurrently with the MME518 (Thesis Writing and Presentation).

MDME517 - Graduate Research

Planned learning activities and teaching methods:	<p>The Student is expected to use appropriate analytical, modelling and experimental methodologies for the implementation of the objectives of the Master’s project approved by the student’s Assessment Committee in the MME516 (Research Preparation and Proposal) course.</p> <p>The Student is expected to meet regularly with his Thesis Advisor to ensure that the set objectives, methodologies and planning are met.</p>
Assessment methods and criteria:	<p>For a typical full time student, this course is taken concurrently with the MME518 (Thesis Writing and Presentation). The assessment for both courses (MME517 and MME518) is done using the same criteria and weights, with the two courses assigned the same grade. If a student completes the requirements of the MME517 course, without completing MME518, then he is assigned a “Satisfactory Progress (SP)” grade for MME517. The final grade is granted to the student with the completion of both courses (MME517 and MME518).</p> <p>Assessment Weights:</p> <ul style="list-style-type: none"> • Adequacy of sources consulted: 20% • Design methodology / implementation: 20% • Evaluation methodology: 20% • Presentation and discussion of results: 20% • Oral Presentation: 20%

MDME518 - Thesis Writing and Presentation

Learning outcomes of the course unit:	<ul style="list-style-type: none">• Produced a structured written report on the work of a Master’s level research project.• Critically comment on the results of a research work and relate to other published research and scientific work.• Employ a variety of tools and media to present the work of a Master’s level research project.• Defend orally the implementation and evaluation methodologies employed, as well as the outcomes of a Master’s level research project.
Course contents:	<p>This is the third of the three courses that constitute the Masters Thesis, which is a research oriented work at the forefront of knowledge within the specialization of the student.</p> <p>After conducting their research work, students are expected to deliver a detailed project report that describes their research work and also present their project outcomes to their project Assessment Committee, as well as defend their work during an oral presentation. This course is graded in conjunction with the Graduate Research (MME17). Both courses are assigned the same grade.</p>

MDME518 - Thesis Writing and Presentation

Planned learning activities and teaching methods:	The Student is expected to work independently to produce a written report on the work of the Master's Thesis, and to prepare a presentation for the oral defence of the Thesis.
Assessment methods and criteria:	For a typical full time student, this course is taken concurrently with the MME517 (Graduate Research). The assessment for both courses (MME517 and MME518) is done using the same criteria and weights, with the two courses assigned the same grade. If a student completes the requirements of the MME517 course, without completing MME518, then his assigned a "Satisfactory Progress (SP)" grade for MME517. The final grade is granted to the student with the completion of both courses (MME517 and MME518).
	Assessment Weights: <ul style="list-style-type: none"> • Adequacy of sources consulted: 20% • Design methodology / implementation: 20% • Evaluation methodology: 20% • Presentation and discussion of results: 20% • Oral Presentation: 20%

Frederick University Regulations for Master Thesis

The graduate students at Frederick University enrolled for Master Thesis project for the requirements of Master Programme should follow the regulations outlined in the present document, which will be monitored by the allocated Supervisor, the Programme Coordinator and the Master Thesis Evaluation Committee.

Requirements:

- Master thesis allocation form.
- Project formulation presentation (including objectives, proposed methodology, steps and expected results outline) (during the first week of the semester).
- Weekly hour-meeting with supervisor
- Executive summary (1000 words concise summary of the project)
- Submission of Thesis report 3 hard copies hard-bounded and an electronic copy
- Oral examination to the Master Thesis evaluation Committee (after submission of Thesis report)

"thesis" from a Greek word meaning "position", refers to an intellectual proposition.

"Dissertation" - from Latin dissertātiō, meaning "discourse."

The word thesis is used as part of a Bachelors or Masters course. Dissertation is applied to a Doctorate.

Frederick University Regulations for Master Thesis

Thesis structure and content:

1. Abstract
2. Introduction
3. Literature review
4. Methodology and techniques description
5. Formulation of the practical problem and solution with appropriate methodology
6. Development of hypotheses, elaboration of evaluation schemes, comparative and parametric analysis, production of results, analysis and discussion
7. Conclusions
8. References

Frederick University Regulations for Master Thesis

Level and depth:

- Develop a systematic approach in novel problem solving situations.
- Cultivate critical approach in selecting tools and techniques to comprehensively cope with industrial problems.
- Apply, in a holistic manner, acquired knowledge in realistic problem solving situations.
- Develop professional approach in preparing, presenting and defending reports.

Assessment evaluation:

- Project formulation presentation
- Weekly progress
- Thesis report
- Executive summary
- Thesis oral presentation

Master Thesis Cover



FREDERICK UNIVERSITY
Department of Mechanical Engineering

**MSc in Manufacturing and
Welding Engineering Design**

MASTER THESIS

Supervisor: Dr. Antonios Lontos

«WRITE YOUR PROJECT TITLE»

Student Name: Georgiou George

Reg. Num.: 9000

Nicosia - Cyprus

JUNE 2016



FREDERICK UNIVERSITY
Department of Mechanical Engineering

**MSc in Manufacturing and
Welding Engineering Design**

MASTER THESIS

Supervisor: Dr. Antonios Lontos

«WRITE YOUR PROJECT TITLE»

Student Name: **GEORGE GEORGIU|**

Reg. Num.: **1000**

Nicosia - Cyprus

JUNE 2016

**Thank you for
your attention**