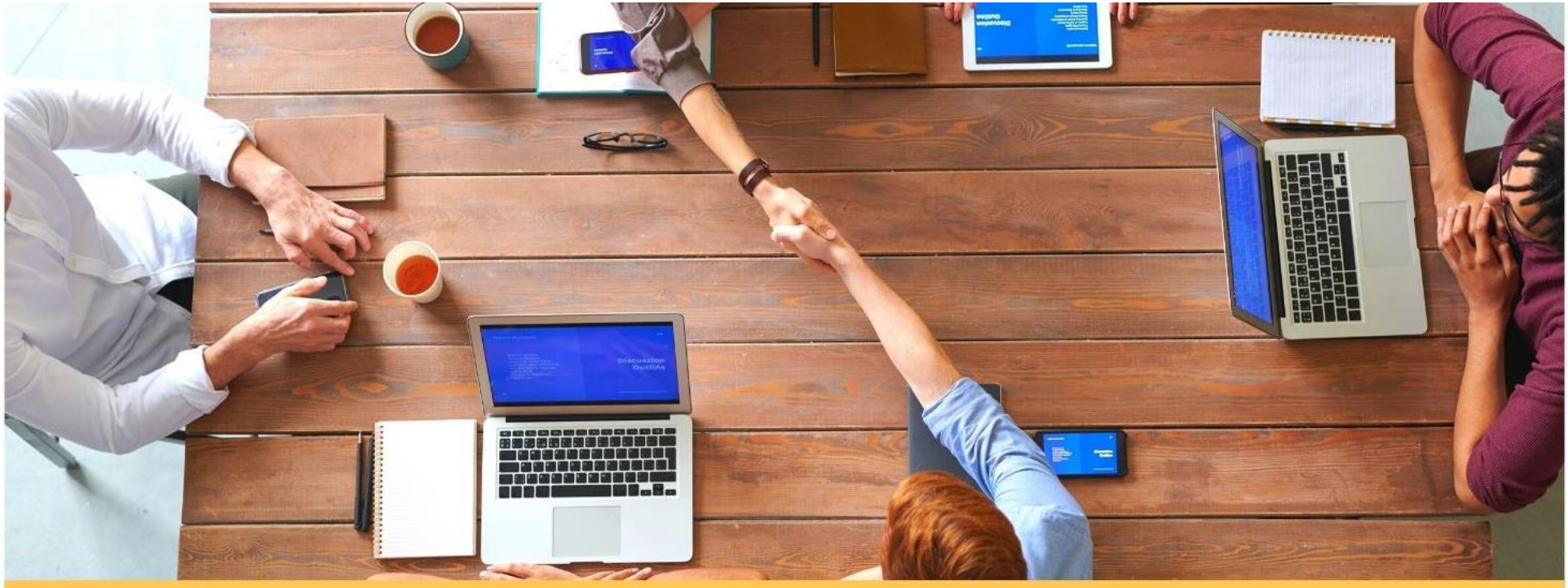

2022

Course Catalog

Hellenic Mediterranean University

ATHENA
EUROPEAN UNIVERSITY

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ATHENA
EUROPEAN UNIVERSITY

IRO-ACADEMY

International Relations Office
IRO-Academy

IRO-ACADEMY

The International Relations Office IRO-Academy, is the Academic Part of the office that offers Modules in English with Scientific and Cultural Research Topics to ***ALL Erasmus*** Students.

Students from **ALL Departments** could choose one or more of the lessons provided by our Office that they find interesting and/or important in order to satisfy completion of the studies and in order to complete the number of ECTS required for the Erasmus Program.

We are also pleased to offer lessons available online from our Partners in the ATHENA European University

The lessons provided by the HMU IRO-Academy are:

1) Soft and Research Skills Development

Course Code	ER0001
Course Title	Soft and Research Skills Development
ECTS	5
Tutor	Dr. Konstantinos Petridis cpetridis@hmu.gr
Prerequisite/ Corequisite	--
Semester	It is offered in both of the semesters
Objectives	Soft skills are a combination of people skills, social skills, communication skills, character or personality traits, attitudes, career attributes, social intelligence, and emotional intelligence that enable people to navigate their environment, work well with others, perform well, and achieve their goals with complementing hard skills. The Collins English Dictionary defines the term “soft skills” as “desirable qualities for certain forms of employment that do not depend on acquired knowledge: they include common sense, the ability to deal with people, and a positive flexible attitude.

	Research skills like Bibliographic research, Academic Writing, Poster Presentation, Promotion of your Research, Grant Writing, Interview Tips and Digital Skills are also important to be taught from the final undergraduate year of any discipline. The **objectives** of the course (offered for undergraduate and postgraduate students) are the following: Develop an understanding of the importance of soft & research skills including how soft & Research skills are: • Connected to technical or hard skills • Raise awareness amongst students, teachers, and professionals • Identify necessary soft skills depending on expertise • Assess how soft skills can be improved • Clarify and apply effective communication skills • Define and outline effective leadership skills including best practices • Examine and develop sense of self and culture • What are the Soft Skills a Scientist should have (Time Management, Problem Solving and Communication Skills) • How Research Skills are connected with your research and professional career
Intended Learning Outcomes	The Learning Outcomes of the Soft & Research Skills Development Module are the following: • to be able to provide an overview of the most wanted soft skills the labor market requires • to be able to apply the presented soft & research skills in her daily academic and research life • to be able to cope successfully in an interview process • to be able to analyze a complex problem into smaller units • to be able to present, negotiate and convince of her claims • to be able to write, submit and evaluate her work • to be able to communicate digitally and face to face communication • to be able to come back from fall back • to be able to adapt in any new professional or social environment
Indicative Syllabus	An indicative syllabus of the course follows: 1. Definition of Soft Skills & their Importance for Professional Development and Survival 2. Building Your Oral Presentation Skills

	3. Building Your Time Management Skills 4. Building Your Stress Management Skills 5. Building Your Critical Thinking Skills 6. Building Your Problem Solving Skills 7. Building Your Resilience Skills 8. Building Your Collaboration Skills 9. Building Your Adaptability Skills 10. Building Your Leadership Skills 11. Building Your Academic Writing Skills 12. How to Promote Your Research 13. How to Build Your Network and Write a Proposal 14. Building Your Interview Skills 15. Building Your Digital Skills 16. Building Your Digital Profile 17. How to use LinkedIn for your Career Development 18. Building Your Negotiation Skills 19. Building Your Motivation Skills 20. Building Your Emotional Intelligence Skills
Teaching/Learning Methodology	**Lectures (online, face to face):** Every week three hours **Seminars:** One seminar per two weeks where an external speaker interacts with our students in one of the aforementioned topics **Workshops**: Where students practice the soft skills are taught
Assessment Methods in Alignment with Intended Learning Outcomes	Final Test (70% of the overall grade) Presentations during the course (30% of the overall grade)
Students' Working Load	Lectures: 36 hrs Homework/Study Time 108 hrs Seminars: 12 hrs

	In total 156 hours → 5ECTS
Reading List and References	• Lecture's Notes • Mindtools (https://www.mindtools.com/) • Harvard Business Review Journal (https://hbr.org/) • Coursera (https://www.coursera.org/) • EdX (https://www.edx.org/)

2) Introduction to Research Methods

Course Code	ER 0002
Course Title	Introduction to Research Methods (Spring Semester)
ECTS	5
Level of Studies	Undergraduate
Tutor	Dr. George Kritsotakis
E-mail	gkritis@hmu.gr
Learning Outcomes / Description	: In this course the students will have the opportunity to establish or advance their understanding of the research process. We will begin by establishing which are the reliable scientific resources and how to review the existing literature. This will be helpful in identifying significant gaps, coming up with novel and important research questions to investigate, and preparing a research proposal. We will also discuss different research methodologies within quantitative and qualitative paradigms including, among others, interviews, focus groups, diaries, and surveys. An important issue will be to debate on the ethical principles and challenges of the research activity and the relevant approval processes.

Prerequisites	None
Assessment	During the semester students will be asked to present and critically analyze published research and present a small research proposal.
Teaching / Learning Methodology	lectures, case-studies, individual and group assignments.
Recommended Literature	Belias, D., Rossidis, I., Papademetriou, C., & Mantas, C. (2021). Job Satisfaction as Affected by Types of Leadership: A Case Study of Greek Tourism Sector. Journal of Quality Assurance in Hospitality & Tourism, 1-19. Blumberg, B., Cooper, D. R., & Schindler, P. S. (2008). Business research methods. London: McGraw-Hill Higher Education. Chang, H. Y., Chu, T. L., Liao, Y. N., Chang, Y. T., & Teng, C. I. (2019). How do career barriers and supports impact nurse professional commitment and professional turnover intention? Journal of Nursing Management, 27(2), 347-356.

3)PROJECT MANAGEMENT

Course Code	ER 0007
Course Title	Project Management
ECTS	5
Prerequisite/ Corequisite	--
Semester	2nd (spring)
Tutor	Dr. Tomaz Aljaz from University FINI Slovenia
Objectives	The **Project management** aims to utilize understanding the principles and practices of project management in the area of digitalization. The students will learn and understand the strengths and drawbacks of project management. The main goal is to improve the effectiveness of the students in project management: from initiation to day-to-day activities,

	including skills and competences of the project manager, to manage, plan, monitor, and control projects of various types.
Intended Learning Outcomes	Knowledge and understanding: • Foundations of project management and its importance to the success of projects • Understand the process of managing projects, including project plan, human behavior, interdependencies, rules and measurement. • Effectively apply learned concepts (e.g., CCPM, Scrum) in day-to-day environment.
Indicative Syllabus	• Introduction of Project management • Traditional way of managing projects / V-model • Limitation of traditional project management principles • Ensuring stability, predictability and reliability of deliverables • Reducing time needed for finishing tasks and work in progress • Agile Project management • Critical Chain Project Management • Scrum • Project lifecycle • Case study
Teaching/Learning Methodology	• Lectures with active student participation (explanation, discussions, questions, examples and problem-solving). • Homework related to personal or working environment (reflecting personal experience, project work, teamwork, methods of critical judgement, discussions, giving feedback, and educational games). • Experimental exercises that are based on experience, cooperation and problem learning (independent study, discussions, explanation, observation, teamwork, case study, method of critical reading and writing, role play, collaborative learning, evaluation, self-evaluation).
Assessment Methods in Alignment with Intended Learning Outcomes	Weekly homework: 100%
Students' Working Load	Tutorials 36 hrs Homework 36 hrs Self study 72 hrs In total 144 hours → 5ECTS
Reading List and	• Meredith, R. J. in Mantel, S. J. (2000): Project Management, 4th ed, John Wiley & Sons, Inc.

References	• Lewis, J. P. (2006): Fundamentals of Project Management. American Management Association. • Eliyahu M. Goldratt. The Goal: A Process of Ongoing Improvement, Gower Publishing Ltd; 30th Anniversary Edition, 2012 • Eliyahu M. Goldratt. Critical Chain. 1997 • Rob Newbold. Project Management in the Fast Lane, 1998 • Eliyahu M. Goldratt. Production the TOC Way with CD simulator • Kent Beck, Cynthia Andreas. Extreme Programming Explained: Embrace Change 2nd Edition, 2004 • Ken Schwaber and Jeff Sutherland: The Scrum Guide,2020

3) Introduction to History of Crete and GREECE

Course Code	ER 0003
Course Title	INTRODUCTION TO HISTORY OF CRETE & GREECE
ECTS	3
Level of Studies	Undergraduate
Tutor	Dr. Gareth Owens
E-mail	ogareth@hmu.gr
Brief Description	a) Cretan and Hellenic Mythology, b) Cretan History – Minoan,

	c) Cretan History – Hellenic, Roman, Byzantine, Arabic, Venetian, Turkish and 20th Century. d) Hellenic History e.g. Classical Athens and Democracy, Delphi and Religion, Epidaurus and Theatre, Olympic Games, Macedonia and Alexander the Great etc. and Roman, Byzantine, Turkish and 19th-20th Century. e) Cretan Culture and Tradition. f) Study Trips to Museums, Archaeological Sites and Places of Interest.
Learning Outcomes	To acquaint the visiting European Students (ERASMUS+) with the rich history, language, culture and civilization of Crete and Hellas
Prerequisites	Students could manage to obtain ENGLISH LANGUAGE B2
Assessment	Written Assignment (3000 Words in English) on a mutually agreed research project on an aspect of Cretan Culture, or a Certificate of Attendance will be awarded.
Recommended Literature	http://history.heraklion.gr/background.php?url=index&id=&cat=&open=&lang=441&chron= and https://www.teicrete.gr/daidalika/ and Supplementary Material

4) Introduction to Philosophy-Past Present Future

Course Code	ER 0004
Course Title	INTRODUCTION TO PHILOSOPHY – PAST PRESENT FUTURE
ECTS	3
Level of Studies	Undergraduate

Tutor	Dr. Gareth Owens
E-mail	ogareth@hmu.gr
Brief Description	Our age has raised expectations and dangers to the limit. In our everyday life we make decisions and choices that may influence society far beyond our perception. This lesson, in the form of series of discussions, aims at presenting views on problems essential for the totality of life. Ecology, economy, geopolitics, religion, policy in general, art, education and the bright side of life, are presented and discussed freely. There is no "correct" view or dominant ideology. Arguments can be of logical, scientific, historical, or even emotional origin, they cannot be self-centered or irrational.
Learning Outcomes	What would it be like to be in a school in ancient Athens with Socrates-Plato-Aristotle? You certainly would not have to write long essays because you would not have paper. Nor would it be required to remember names and theories, as they were not in books yet. Now, having the internet, a group of students, can equally well do their search for a personal truth by using logic & common sense. Expression, communication, discussion, freedom of constraints can be so fruitful in acquiring the individual personal way of thinking.
Prerequisites	ENGLISH LANGUAGE B2
Assessment	Written Assignments (3000 words) on mutually agreed projects etc. and Class Contribution and Lesson Participation. After the introductory lecture, students are asked to choose from a list of subjects and they present the material to the group and set the intro for the discussion that follows From Odysseus and Aristotle to Harari and Ithaki – General Bibliography Inspired by Stephen Fry, Mythos, the Greek Myths Retold (2017), and Heroes, Mortals and Monsters, Quests and Adventures (2018); Daniel Mendelsohn, An Odyssey, A Father, a Son, and An Epic (2017) and The Bad Boy of Athens, Classics from the Greeks to Game of Thrones (2019); Edith Hall, The Ancient Greeks: Ten Ways They Shaped the Modern World (2016) & Aristotle's Way, Ten Ways Ancient Wisdom Can Change Your Life (2018); Anthony Gottlieb, The Dream of Reason, A History of Western Philosophy from the Greeks to the Renaissance, (2000) & The Dream of Enlightenment, The Rise of Modern Philosophy (2016); Yuval Noah Harari, Sapiens, A Brief History of Humankind (2011), which explores the past, Homo Deus, A Brief History of Tomorrow (2015), which explores the future, & 21 Lessons for the 21st Century (2018) and Lewis Dartnell, Origins: How the Earth Shaped Human History (2019); as well as Garry Kasparov, Deep Thinking, Where Machine Intelligence Ends and Human Creativity Begins (2017) and Jonathan Rowson, The Moves that Matter, A Chess Grandmaster on the Game of Life (2019); Charles Darwin, The Origin of Species, 1859, Penguin 1985 and Aristotle, 384-322 BC, Metaphysics, Penguin 1998. Lord Byron, Selected Poems, 1996; James Joyce, Ulysses, 1922, Penguin 2000; Sun-Tzu, The Art of War, 2002; George Orwell 1984 and Animal Farm (20)

	<u>Πάντες ἄνθρωποι τοῦ εἰδέναι ὀρέγονται φύσει</u> <u>'By nature, all men long to know'</u> <u>'All humans, by nature, desire knowledge'</u> <u>'All human beings by nature yearn for knowledge'</u> <u>Penguin Books in Translation</u> Who's Who in the Ancient World, Greek Literature – An Anthology; Homer – The Iliad & The Odyssey, The Homeric Hymns, The World of Odysseus; Hesiod and Theognis, Theogony, Works and days, Elegies; Aesop, The Complete Fables; Aeschylus – The Oresteia, Sophocles – The Theban Plays; Euripides – Medea and Other Plays, Bacchae and Other Plays; Aristophanes – Lysistrata and Other Plays; Plato – The Republic, The Laws, The Last Days of Socrates, The Symposium; Aristotle – Metaphysics, Art of Rhetoric, On the Soul, Poetics, Athenian Constitution, Politics; Sappho – Stung with Love, Poems and Fragments; The Hippocratic Writings, The Greek Sophists, Early Greek Philosophy; Pausanias – Guide to Greece, Herodotus – The Histories, Plutarch – The Age of Alexander, Arrian – The Campaigns of Alexander, Apollonius of Rhodes – the Voyage of Argo; The Penguin Book of Greek Verse (33) Comics/Graphic Novels, Sapiens, Harari; 300 Spartans, Miller & Varley; Erotokritos, Kornaros; Alki Zei, Peter's Long Walk; History of Crete, Sifis and Company, Democracy, Logicomix, Dune, and, Biography of George Orwell. (10) Nikos Kazantzakis, At the Palaces of Knossos & Alexander the Great Tales of Troy and Greece, Andrew Lang, 1978 (66)
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Recommended Literature	Inspired by Stephen Fry, Mythos, the Greek Myths Retold (2017), and Heroes, Mortals and Monsters, Quests and Adventures (2018); Daniel Mendelsohn, An Odyssey, A Father, a Son, and An Epic (2017) and The Bad Boy of Athens, Classics from the Greeks to Game of Thrones (2019); Edith Hall, The Ancient Greeks: Ten Ways They Shaped the Modern world (2016) & Aristotle's Way, Ten Ways Ancient Wisdom Can Change your Life (2018); Anthony Gottlieb, The Dream of Reason, A History of Western Philosophy from the Greeks to the Renaissance, (2000) & The Dream of Enlightenment, The Rise of Modern Philosophy (2016); Yuval Noah Harari, Sapiens, A Brief History of Humankind (2011), which explores the past, Homo Deus, A Brief History of Tomorrow (2015), which explores the future, & 21 Lessons for the 21st Century (2018) and Lewis Dartnell, Origins: How the Earth Shaped Human History (2019); as well as Garry Kasparov, Deep Thinking, Where Machine Intelligence Ends and Human Creativity Begins (2017) and Jonathan Rowson, The Moves that Matter, A Chess Grandmaster on the Game of Life (2019); Charles Darwin, The Origin of Species, 1859, Penguin 1985 and Aristotle, 384-322 BC, Metaphysics, Penguin 1998. Lord Byron, Selected Poems, 1996; James Joyce, Ulysses, 1922, Penguin 2000; Sun-Tzu, The Art of War, 2002; George Orwell 1984 and Animal Farm (20), and Supplementary Material.

5) English for Academic Purposes

Course Code	ER 0005
Course Title	ENGLISH FOR ACADEMIC PURPOSES
ECTS	2
Level of Studies	Undergraduate
Tutor	Dr. Gareth Owens
E-mail	ogareth@hmu.gr
Brief Description	• Can understand a wide range of demanding, longer clauses, and recognize implicit meaning. • Can express ideas fluently and spontaneously without much obvious searching for expressions. • Can use language flexibly and effectively for social, academic and professional purposes. • Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors and cohesive devices.
Learning Outcomes	Students could manage to obtain C1 Effective Operational Advanced English
Prerequisites	ENGLISH LANGUAGE B2
Assessment	Written Assignments and Class Contribution and Lesson Participation
Recommended Literature	Zoe Kantaridou, English for Academic Purposes, Reading and Vocabulary, Student's Book, 2nd Revised Edition, University of Macedonia Press Thessaloniki 2011 Ruth Spack, Tufts University, Guidelines, a Cross-Cultural Reading/Writing Text, Second Edition, Cambridge University Press, 1998, and Supplementary Material.

6) Greek Language

Course Code	ER 0006
Course Title	GREEK LANGUAGE
ECTS	2
Level of Studies	Undergraduate
Tutor	Dr. Gareth Owens
E-mail	ogareth@hmu.gr
Brief Description	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce themselves and others and can ask and answer questions about personal details such as where they live, people they know and things they have. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.
Learning Outcomes	Students could manage to obtain A1 Breakthrough or beginner
Prerequisites	ENGLISH LANGUAGE B2
Assessment	Written Examination and Class Contribution and Lesson Participation

Recommended Literature	Kleanthes & Frossos Arvantakis, Communicate in Greek for Beginners, Course Book + Audio CD, Deltos Publishing, First Edition July 2010, Reprinted September 2014. Kleanthes & Frossos Arvantakis, Communicate in Greek for Beginners, Workbook One, Deltos Publishing, First Edition July 2010, and Supplementary Material

DEPARTMENT OF MECHANICAL ENGINEERING

HERAKLION

Department of Mechanical Engineering

HERAKLION

MECHANICAL DESIGN I

Course Title	**Mechanical Design I**
ECTS	5
Tutor	Petousis Markos
Semester	Autumn semester
Objectives	"Mechanical Design I" aims in integrating basic mechanical engineering knowledge for the processing of technical problems related with the products design. Basic mechanical engineering knowledge, such as mechanical drawings, materials technology, mechanics, materials strength, machine elements and manufacturing technologies, are combined in an applied level for the design and development of a new or the redesign of an existing mechanical product. Understanding the industrial design stages (from the conceptual design, to the process of the idea and the evaluation of the prototype) is achieved from the students with the implementation of a mechanical design project through decision making processes.
Intended Learning Outcomes	The student who has successfully completed the Mechanical Design I class, will have the ability to: • Analyze a technical problem related to the design of a mechanical product • Seek ideas that lead to the solution of a technical problem • Select the optimum solution and covert it to a mechanical setup • Implement full design of the mechanical setup

	• Manufacture a prototype model for the mechanical setup Present the developed solution of the technical problem studied
Indicative Syllabus	1. The mechanical design process 2. Technical problems formulation and analysis 3. Collection and processing of information 4. Specifications list 5. Conceptual Design 6. Synthesis and evaluation of technical solutions 7. Development and design of a technical solution - Materials, parts, standardization - Loads, construction analysis - Kinematics, mechanisms - Safety - Manufacturing and production - Assembly - Maintenance, reliability - Aesthetics, ergonomics - Billing - Innovation - Design optimization 8. Production systems and processes selection 9. Organizing and administration of working groups 10. Mechanical design software tools in the computer
Teaching/Learning Methodology	**Lecture:** related to products design methodologies, NQM diagrams, 3d geometric modelling, finite elements analysis, market survey, standardized mechanical parts **Tutorial:** 3d geometric modelling, finite elements analysis
Assessment Methods in Alignment with Intended Learning Outcomes	Written Report 100% For the project implementation students employ advanced products design, analysis and prototype manufacturing methods, such as CAD/CAM/CAE software tools and 3d printers.

Students' Working Load	Lectures 60 hours Written Report 18 hours Oral Presentation 2 hours Homework 70 hours In total 150 hours → 5ECTS
Reading List and References	1. K. LEE. Principles of CAD/CAM/CAE Systems, 1999. 2. I. ZEID. CAD/CAM theory and practice. McGraw Hill, New York, 1991. 3. S. Rao, The Finite Element Method in Engineering 6th Edition, Butterworth-Heinemann, 9780128117682, October 2017 4. Saad A. Ragab, Hassan E. Fayed Introduction to Finite Element Analysis for Engineers CRC Press ISBN 9781138030176 2018

HEAT TRANSFER II

Course Title	**Heat Transfer II**
ECTS	5
Tutor	Tzirakis Costas
Semester	Autumn semester
Objectives	The course presents a detailed description of conduction, convection and radiation. It is mainly focused on 1-D and 2-D steady state and transient systems. A significant part of the course is dedicated to radiation (properties and radiation exchange between surfaces), view factors and thermal resistance circuits. Heat exchangers and basic storage units theory is also covered as a means for studying and finally selecting appropriate heat exchangers.
Intended Learning	Upon completion of the subject, students will be able to:

Outcomes	a) understand the basic concepts of conduction, convection and radiation. b) perform combined studies of all heat transfer modes in various environments (houses, factories, etc.). c) calculate heat loss from fins of uniform and non-uniform cross section. d) understand the basic concepts of thermal boundary layer and solve complicated thermal resistance circuits (Kirchhoff's law, view factors, black body radiation etc.). e) study the finally select the appropriate heat exchanger that suits specific and well-defined requirements.
Indicative Syllabus	1. Introduction (4 hours) o Introduction to conduction, convection, and radiation 2. 1-D heat transfer (8 hours) o Mathematical formulation of 1-D heat transfer o Example problems on various geometries 3. 2-D heat transfer (8 hours) o Mathematical formulation of 2-D heat transfer o Example problems on various geometries 4. Radiative hear transfer and view factors (8 hours) o Introduction to electromagnetic waves, Planck's radiation law and black body radiation o Integral calculus and view factor computation of specific geometric configurations 5. Thermal resistance circuit (4 hours) o Kirchhoff's current law for heat transfer o Series and parallel thermal networks 6. Example problems on radiative heat transfer (8 hours) 7. Heat exchangers (8 hours) o Understanding heat exchangers, basic principles and design characteristics o Example problems on heat exchangers
Teaching/Learning Methodology	**Lecture:** the lectures are performed using PowerPoint presentations, lecture notes and textbooks on heat transfer. **Tutorial:** some of the lectures are specifically designed as tutorial classes where example problems will be presented and group discussions will assist the students in understanding the appropriate material.
Assessment Methods in Alignment with	Mid-term exam: 30% Final exam: 70%

Intended Learning Outcomes	
Students' Working Load	Lectures 48 hours Self-study 42 hours Homework 60 hours In total 150 hours → 5 ECTS
Reading List and References	1. Heat Transfer: Pitts and Sissom, Schaum's outlines 2. Introduction to Engineering Heat Transfer: Nellis and Klein, Cambridge University Press 3. Fundamentals of Heat and Mass Transfer: Incropera, DeWitt, Bergman and Lavine

MACHINE DYNAMICS AND VIBRATIONS

Course Title	Machine Dynamics and Vibrations
ECTS	5
Tutor	Papadakis Nicos
Semester	Autumn semester
Objectives	The analysis of motion, velocity, acceleration, and forces in mechanisms and machines. Emphasis is placed on the modelling of the physical system and the derivation of the equation of motion. Additionally analytical methods suitable for hand calculation, computerized analysis and preliminary design studies. The course starts with the simpler Single DOF systems, and gradually set the foundation to Multiple DOF systems and modal analysis. Special emphasis is placed on Vibration isolation and some common applications.
Intended Learning	The course Machine Dynamics and Vibrations aims that the student upon successful completion is able to:

Outcomes	f) recognize standard mechanical dynamical systems and their order g) identifies the basic dynamic characteristics that affect the dynamics of mechanical systems h) qualitatively evaluates the dynamic and oscillating behavior of mechanical systems with linear characteristics. i) To calculate the dynamic and oscillating behavior of mechanical systems. j) Develop models for standard mechanical dynamical systems with appropriate simplifications/assumptions k) evaluate dynamic systems, l) apply methodologies in the design of mechanical oscillation isolation devices.
Indicative Syllabus	Review kinematics and kinetics of particles. Single degree of freedom systems • Vibration for mass-spring system, natural frequency. • Rotational vibration (Systems involving pendulums). • Finding the stiffness of complicated systems and real life components. • Equation of motions for complicated vibratory systems. • Damping in 1-DOF systems. • Forced vibration (Applied force and also unbalanced rotation), and resonance. • Forced vibration (Base Excitation) • Transient response (convolution integral) • Solution approaches (numerical, laplace, transfer functions) Two degree and multiple degree of freedom systems • Introduction with the 2dof system • Eigenvalues and Natural frequencies • Modal analysis • Free vibrations of MDOF systems • MDOF Systems with Viscous Daming • Forced vibrations of MDOF • Intro Vibration of Continuous System. Design for Vibration suspension • Acceptable levels of vibration • Vibration isolation

	• Vibration absorbers • Daming in Vibration Absorption • Critical Speeds of rotating disks (Jeffcott motor, Rayleigh approach
Teaching/Learning Methodology	**Lecture:** the fundamentals of *Machine Dynamics and Vibration* will be described using ppt presentations, demonstrating videos, Internet. The students are free to request help. The students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. **Tutorial:** a set of problems and group discussion topics will be arranged in the tutorial classes. Students are encouraged to solve problems before having solutions.
Assessment Methods in Alignment with Intended Learning Outcomes	Bi weekly tests : 30% Reports : 20% Written Report : 50% Continuous assessment consists of bi-weekly small tests, reports. The continuous assessment will assess the students' understanding of basic concepts and principles in the lecture content.
Students' Working Load	Lectures 39 hrs Tutorials 26 hrs Homework 30 hrs Self study 55 hrs In total 150 hours → 5ECTS
Reading List and References	1. Gans Mechanical Systems A Unified Approach to Vibrations and Controls, Springer Verlag 2. S.Kelly Mechanical Vibrations: Theory and Applications, Cengage Learning 3. S.S.Rao, "Mechanical Vibrations", Pearson; 5th edition (September 17, 2010) 4. D.Inman "Engineering Vibrations", Pearson; 4th edition (March, 2013)

Mechanical Drawing II

Course Description

Course Title	Mechanical Drawing II
ECTS	5
Prerequisite/ Corequisite	--
Semester	Spring semester
Objectives	The **Mechanical Drawing II - CAD** aims to utilize and deepen the existing basic knowledge, standardizations and regulations, acquired in the Mechanical Drawing I and their applications in integrated Mechanical Drawings. The students will be invited to realize drawings of assemblies of mechanical devices.
Intended Learning Outcomes	The aim of the course of the **Mechanical Drawing II - CAD** is to offer to the students the opportunity to apply the rules of the Mechanical Drawing and the standardization of machine elements and parts, in order to acquire the ability and the skills: • to know in depth the international regulations of standardization of the Mechanical Drawing, • to understand complex mechanical drawings and assemblies, as a composition of the individual parts, • to ttransform their thoughts, ideas and calculations into engineering drawings regardless of the degree of complexity • to make the desired or necessary corrections, upgrades and modifications of complex mechanical devices • to prepare complex mechanical drawings in appropriate design software. In Engineering Drawing II - CAD, the students are trained in depth, in 2D computer aided design using the AutoCAD platform.
Indicative Syllabus	Preparation of 13 engineering drawings and assemblies for the implementation of all the following modules: 61. Tolerances in the mechanical drawing. 62. Welding and design of welded structures. 63. Drawings of machine elements and parts of any kind. 64. Search and use templates and machine component catalogs. 65. Views, sections and half sections of assemblies. 66. Drawings of mechanical assemblies using normalized machine elements (threads, screws, shafts, bearings, gears, pulleys, springs, seals, piping, reducers, welds).
Teaching/Learning	**Tutorial:** Mechanical drawings of typical mechanical engineering assemblies.

Methodology	
Assessment Methods in Alignment with Intended Learning Outcomes	Weekly Drawings: 100%
Students' Working Load	Tutorials 40 hrs Homework 60 hrs Self study 50 hrs In total 150 hours → 5ECTS
Reading List and References	• Manual of Engineering Drawing: British and International Standards, Colin H. Simmons, Dennis E. Maguire, Neil Phelps. • Engineering Drawing, N S Parthasarathy, Vela Murali. • Learn AutoCAD!: Mechanical Drawing Using AutoCAD® 2017, David Martin. • AutoCAD 2007 Introduction to mechanical drawing and tutorial examples, BEN SHE.YI MING.

MECHANICAL DESIGN II

Course Title	MECHANICAL DESIGN II
ECTS	5
Tutor	Vairis Achilleas
Prerequisite/ Corequisite	-
Semester	Spring semester

Objectives	Mechanical Design II scopes in applying and expanding the basic engineering knowledge already acquired during previous semesters in order to: • advance his mechanical engineering education, a fundamental requirement for any professional engineer and • Overall management of a technical design problem of a mechanical part or device.
Intended Learning Outcomes	The appropriate combination of basic Engineering knowledge aims to the design of a new product or the redesigning an existing one. Understanding the stages of industrial design (from conception and elaboration of the idea, to the fabrication and evaluation of a prototype) is carried out as a group effort within a student design team.
Class Contents	1. The conceptual design processes. 2. Formulation and analysis of engineering problems. 3. Information Collection – Processing. 4. Specification list. 5. Composition - Review of technical solutions. 6. Development – Optimal Design of a technical solution. 7. Design organization and administration
Students' Working Load	Semestrial Project: Conceptual design of a machine or mechanism Project thesis and presentation

STATISTICS AND PROBABILITY

Course Title	**Statistics and probability**
ECTS	**5**
Tutor	Papadakis Nikos
Prerequisite/ Corequisite	-
Semester	**Spring semester**

Objectives	Introduction to probability and statistical inference. Topics include sample spaces, conditional probability and Bayes' rule, random variables, discrete and continuous probability distributions, expectation, estimation, and hypothesis testing. The course objective is to provide a foundation in probability theory and statistical inference to solve applied problems and to prepare for more advanced courses.
Intended Learning Outcomes	The course aims to impart to students theoretical knowledge and experience in practical application on probability theory, statistics and the basic concepts of stochastic analysis. Upon successful completion of the course the student will be able to: • Clearly explains concepts of statistics and probability • calculate quantities for probability distributions and random variables • Performs statistical calculations. • develop probabilistic and statistical models for certain applications, to compose approaches to problem solving in the science of engineering (in the strength of materials, production).
Indicative Syllabus	- The role of statistics in engineering - Probability - Discrete RVs and Probability distributions - Continuous RVs and Probability distributions - Joint Probability Distributions - Descriptive statistics - Point Estimation Parameters and Sampling Distributions - Statistical intervals of a single sample - Test of Hypotheses for a single sample - Statistical inference for two samples - Simple linear regression and correlation - ANOVA - Statistical Quality control
Teaching/Learning Methodology	**Lecture:** the fundamentals of *statistics and probability* will be described using ppt presentations, demonstrating videos, Internet. The students are free to request help.

	The students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. **Tutorial:** a set of problems and group discussion topics will be arranged in the tutorial classes. Students are encouraged to solve problems before having solutions.
Reading List and References	▪ Douglas C. Montgomery and George C. Runge, "*Applied Statistics and Probability for Engineers"* ▪ Ronald Walpole "*Probability & Statistics for Engineers & Scientists*". ▪ Mendenhall W. & Sincich T., "Statistics for the Engineering and Computer Sciences", Collier Macmillan Inc., Canada, 1988.

MECHANICS II- APPLIED DYNAMICS

Course Title	**Mechanics II - Applied Dynamics**
ECTS	**5**
Tutor	Papadakis Nikos
Prerequisite/ Corequisite	-
Semester	**Spring semester**
Objectives	This course is an introduction to the dynamics and vibrations of lumped-parameter models of mechanical systems. Topics covered include kinematics, force-momentum formulation for systems of particles and rigid bodies in planar motion, work-energy concepts, virtual displacements and virtual work. Students will also become familiar with the following topics: Lagrange's equations for systems of particles and rigid bodies in planar motion, and linearization of equations of motion. The objective of the course is to provide basic knowledge of engineering dynamics to the students such that they can understand the basics of kinematics and kinetics for both particles and rigid bodies and their motion.
Intended Learning Outcomes	The aim of the course is to introduce the student to the basic principles of the dynamics of material point systems and rigid bodies.

	Upon successful completion of the course the student will be able to: - recognizes the basic of kinematic and dynamic concepts in engineering problems - Evaluates the effect of forces on the motion of bodies in relation to the center of gravity and the moment of inertia. - Calculates the rotational and translational motion of a body under the influence of forces. - Develop equations of motion - Application of vector engineering theorems for solving complex motion problem Evaluation of the change of the kinetic state through the principles of work-energy and Impulse-Momentum
Indicative Syllabus	Introduction Kinematics of Particles - Velocity and acceleration - Linear and Curvilinear motion - Coordinate Systems (Cartesian, Polar, Tangential-normal, spherical) Dynamics of Particles - Newton second law - Linear and angular momentum - Conservative systems - The principle of momentum conservation - Impulse, impulsive motion, and impact - Motion of center of gravity - Orbital mechanics Kinematics of Rigid Bodies - Planar motion of rigid bodies - General 3d motion - Mechanisms - Rotating Frames of Reference - Coriolis - Instantaneous centers Dynamics of Rigid Bodies - Equations of motion - Linear and Angular Momentum conservation

	- Work-Energy principle - Convervation of energy principle - Impulse momentum conservation Mechanical Vibrations - Equation of motion for the simple harmonic oscillator - Free vibrations, eigenfrequency - Damped free vibration, damping ratio - Forced Vibrations
Teaching/Learning Methodology	Lecture: the fundamentals of *applied dynamics* will be described using ppt presentations, demonstrating videos, Internet. The students are free to request help. The students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. Tutorial: a set of problems and group discussion topics will be arranged in the tutorial classes. Students are encouraged to solve problems before having solutions.
Reading List and References	▪ Ferdinard P.Beer and E.Russell Johnston,Jr., Vector Mechanics for Engineers: Statistics and Dynamics, Fifth Edition, McGraw-Hill, 1988. ▪ R.C. Hibbeler, Engineering Mechanics: Statistics and Dynamics, Sixth Edition, MacMillan Publishing Company, USA 1992

PROGRAMMING FOR ENGINEERS

Course Title	**Programming for Engineers**
ECTS	**4**
Tutor	Kozyrakis Giorgos
Prerequisite/ Corequisite	-
Semester	**Spring semester**
Objectives	The course is a continuation of the introductory course in computer programming and aims to expand - complement the knowledge of students in programming and to deepen the knowledge and understanding of programming language and structured programming in general, by applying them to solving problems found in Mechanical Engineering projects. LEARNING RESULTS Upon successful completion of the course the student will be able to: • Solves computational problems in a modern programming environments. • Will acquire the experience for executing practical applications. • Will have acquire a solid foundation for specific projects that require advanced computer programming. • Will have immersed himself in object-oriented programming methods for designing programs, libraries and auxiliary programming tools.
Intended Learning Outcomes	The course is one of the basic courses of Mechanical Engineering, with which the student has the opportunity to be trained in concepts and methods of advanced programming with application in problem solving in Engineering. While attending the course, the student will be taught in the following subjects: • Algorithms and Algorithmic Programming. • Use and Create Classes and Objects. • Permanent storage and retrieval of data. • Create complex graphic objects. • Accuracy and errors of numerical methods. • Numerical solution of linear and non-linear functions.

	• Methods of statistical processing of time series of Environmental and Mechanical applications and advanced statistical data analysis
Indicative Syllabus	-
Teaching/Learning Methodology	-
Reading List and References	-

INDUSTRIAL SYSTEMS AND MAINTENANCE

Course Description

Course Title	Industrial Systems and Maintenance
ECTS	5
Prerequisite/ Corequisite	--
Semester	Spring semester
Objectives	This course is the main course in the field of engineering, as the students which are already familiar with the concepts that govern the requirements, design, specifications, standards, dimensioning, application, operation of basic infrastructure and facilities in the modern industrial environment, will now address the issue of maintenance. The familiar to the student classical concepts of electromechanical installations and networks in general, will be further specialized in their industrial scale and in their adaptation to the respective production needs of industrial units. Furthermore, special industrial facilities are presented along with their requirements and specifications, which the student is not taught in the context of other courses.

	Finally, the student is taught in particular topics related to the operation of these facilities, their availability needs and their methodology of preventive and invasive maintenance, as well as the extension of these concepts to other production equipment
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) To understand, recognize and comprehend the different needs and the scale of facilities and networks in industry. b) To know the principles of design and calculation of the facilities and the relevant equipment available. c) To know the principles of preventive and invasive maintenance of networks, facilities and equipment and how to apply them in industrial environments.
Indicative Syllabus	**Section A: Industrial Facilities** ▪ Introduction to industrial facilities, their categorization and specifications ▪ Characterization of facilities and productive operating environment ▪ Determination of the functional requirements of the industrial environment ▪ Installations and networks of industrial water supply and sewage ▪ Industrial networks and fire detection and extinguishing systems ▪ Installations and systems of heating, cooling, air conditioning, ventilation and dusting in industry ▪ Industrial electrical networks, medium and low voltage, substations, traffic and lighting networks, low current networks and wireless connections. Industrial-scale uninterruptible power supply systems and systems. ▪ Industrial networks for the supply of compressed air and pneumatic power. ▪ Material transport systems. Conveyor belts, lifting devices, pneumatic conveying systems, spatial planning. ▪ Basic environmental management and environmental protection systems against industrial pollution **Section B: Operation and Maintenance of Industrial Facilities and Maintenance** ▪ Supervision and monitoring of the operation of industrial facilities. ▪ The needs and principles of maintenance of machines and facilities. ▪ Mechanical maintenance policies, spare parts management and fault management techniques
Teaching/Learning Methodology	**Lecture:** The fundamentals of Industrial Systems Maintenance theories will be presented and their various applications will be described using ppt presentations. The students are free to request help. The students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance.
Assessment Methods	Exams: 40% Written Report (homework)

in Alignment with Intended Learning Outcomes	and Oral Presentation 60%
Students' Working Load	Lectures 65 hours Written Report (homework) and Oral Presentation 85 hours In total 150 hours → 5ECTS
Reading List and References	• Lindley R. Higginsm: Maintenance engineering handbook, New York: McGrawHill, 1988. • Industrial maintenance reference guide / Robert C. Rosaler, Tyler G. Hicks, project editor, New York : McGraw-Hill, c1987. • Maintenance engineering : organization and management / Frank Gradon, London : Applied Science Publishers, c1973.

SOLAR RADIATION AND APPLICATIONS

Course Description

Course Title	**Solar Radiation and Applications**
ECTS	5
Prerequisite/ Corequisite	--
Semester	Spring semester
Objectives	This course aims to provide understanding of basic and advanced issues related to solar systems, including electromagnetic radiation from the sun, solar geometry, as well as design and dimensioning of photovoltaic systems and solar thermal systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: d) Study and assess of the solar potential of a specific place e) Analyze the basic characteristics of photovoltaic and solar thermal systems f) Characterize the long-term performance of solar thermal systems g) Dimension an autonomous or interconnected photovoltaic system h) Use software tools to estimate the energy production from photovoltaic and solar thermal systems.
Indicative Syllabus	1.Solar radiation basics (1 hour) ○ Basic principles ○ Diffuse and direct solar radiation ○ Measurement 2. Solar geometry (4 hours) ○ Basic angles ○ Solar and civil time ○ Sun paths ○ Estimation of extraterrestrial solar radiation and available solar radiation on Earth's surface 3. Solar thermal systems (5 hours) ○ Operation principle and basic parameters

	○ Flat plate and evacuated tube collectors ○ f-chart method 4. Photovoltaic (PV) systems (6 hours) ○ Physics of a PV cell ○ Types of PV modules ○ Types and components of PV systems ○ Dimensioning of PV systems ○ Other issues related to PV systems (maintenance, etc)
Teaching/Learning Methodology	**Lecture:** Various applications of displays will be described using ppt presentations, demonstrating videos, and internet sites. The students are free to request help. The students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. **Exercises:** A set of problems about the main topics of the course will be arranged in the tutorial classes. The needed written exercises will differ on their initial data for each student.
Assessment Methods in Alignment with Intended Learning Outcomes	Written exercises: 20% Written Report: 60% Oral Presentation: 20% The basic assessment method will be a written project related to a specific topic in solar systems. The evaluation of this project will be based by the quality of the written report, the oral presentation, as well as the feedback with the students during the whole semester. Apart from this, students will also be evaluated by a number of written exercises that will cover the main sections of the course (solar geometry, solar thermal systems and photovoltaic systems).60%
Students' Working Load	Lectures 16 hours Written Report 80 hours Oral Presentation 2 hours Homework – Exercises 52 hours In total 150 hours → 5ECTS
Reading List and References	• Duffie, John A., and William A. Beckman. Solar engineering of thermal processes, 4th edition. John Wiley & Sons, 2013. • Mertens, Konrad. Photovoltaics: fundamentals, technology and practice. 2013.

	• Häberlin, Heinrich. Photovoltaics: system design and practice. John Wiley & Sons, 2012. • Lynn, Paul A. Electricity from sunlight: an introduction to photovoltaics. John Wiley & Sons, 2011.

Final project Thesis (ECTS: 20)

Depends on the subject and the Professor.

Areas of subject: Thermal Transfer, Dynamics, Vibrations, Advanced Manufacturing, Robotics, Wind Energy