University of Applied Sciences of Thessaly

School of Technological Applications

Department of Mechanical Engineering

COURSES OFFERED FOR ERASMUS STUDENTS
2017-2018

	Course Title	Hours/ Week	ECTS	Normal Semester Taught	Semester for Erasmus students		Delivery Method	Level	Language	Instructor
					Spring	Fall				
1	Heat Transfer	5	5	4th	☑		Reading	UG	English	O. Haralampous
2	Computational Methods in Transport Phenomena	4	6	6th	☑	☑	Reading	UG	English	Ch. Dritselis
3	Manufacturing Technology II	4	6	6th	☑		Reading	UG	English	J. Kechagias
4	Finite Element Analysis	4	6	6th	☑		Reading	UG	English	G. Papavasileiou
5	Internal Combustion Engines II	5	6	7th		☑	Reading	UG	English	P. Chassiotis and O. Haralampous
6	Renewable Energy Sources	5	6	7th		☑	Reading	UG	English	O. Haralampous
7	CNC machine Tools	5	6	7th	☑	☑	Reading	UG	English	J. Kechagias
8	Steel Structures	4	6	7th		☑	Reading	UG	English	G. Papavasileiou

ΦΟΙ_Ε.105-5: COURSES OFFERED IN ENGLISH / ΠΡΟΣΦΕΡΟΜΕΝΑ ΜΑΘΗΜΑΤΑ ΣΤΑ ΑΓΓΛΙΚΑ

Faculty: School of Technological Applications

Department: Mechanical Engineering

Course Title	Heat Transfer				
ECTS	5	**Typical Semester**	4 (S)	**Hours/ Week**	5
Brief Description (5-6 lines)					
• Heat transfer laws and principles • Conduction – Steady and transient state • Convection – Free and forced • Radiation • Special applications					
Main Learning Goals (list up to 10)					
• Understanding of the laws and principles of heat transfer • Calculation of heat transfer phenomena in various applications					
Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)	
Student evaluation method/ grading					
• Lecture based …… The student has to attend the 2h laboratory part of the course and submit weekly assignments. • Reading course …. Additional reading material will be supplied and a personal project with exercises will be assigned. The course grade will be based on the project.					

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Course Title	Computational Methods in Transport Phenomena				
ECTS	6	**Typical Semester**	6 (S and F)	**Hours/ Week**	4
Brief Description (5-6 lines)					
Modeling of transport phenomena. Finite difference method. Numerical solution of heat diffusion and convection problems. Introduction to the finite volume method for elliptic differential equations. Introduction to modern CFD software.					
Main Learning Goals (list up to 10)					
• Introduction to the simulation of flow and heat transfer phenomena using numerical methods and modern software (CFD) • Understanding of the contribution of simulation in design and optimization of engineering applications					
Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)	
Student evaluation method/ grading					
• Lecture based …… The student has to attend the software training in the computer lab. Two personal projects will be assigned. The course grade will be based on the presentation of the projects. • Reading course …. Additional reading material will be supplied and explained by the professor.					

Course Title	Finite element analysis				
ECTS	6	**Typical Semester**	6 (S)	**Hours/ Week**	**4**

Brief Description (5-6 lines)

Finite Element Analysis is nowadays a tool of particular necessity in the design and assessment of the performance of structures, from an individual component under constant stress to a complex machine under dynamical loading.
The Finite Element Method and its basic mathematical/analytical background are presented, as well as its main applications in mechanical engineering. The course aims is to introduce students to Finite Element Analysis, as well as the use of F.E. software.

Main Learning Goals (list up to 10)

- Knowledge of the basic mathematical/analytical background of the Finite Element Method
- Application of the method to 2D and 3D objects
- Simulation of complex structures using Finite Element Software

Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)

Student evaluation method/ grading

- **Lecture based ……**
  Students need to attend two 2h-long courses each week. The theoretical part of the course is presented, as well as its application in practice using Finite Element Software.
- **Reading course ….**
  Weekly study is required in order to keep up with the course material taught. Students are also expected to submit an overall project in which they apply in practice the course material taught.
  The final course grade consists 40% of the project grade and 60% of the final examinations score.

Course Title	Manufacturing Technology II				
ECTS	6	**Typical Semester**	6 (S)	**Hours/ Week**	4
Brief Description (5-6 lines)					
Primary Forming processes (materials, tools & dies). Deforming Processes (materials, tools & dies). Contour cutting processes (EDM, AWJM, PAC, etc.). Non-conventional selective material removal processes (Sink EDM, Laser assisted machining, etc.). Additive manufacturing (3D printing, SLA, LOM, FFF, FDM, SLS, SLM, etc.). Flexible manufacturing systems. Joining processes. Tool Coatings					
Main Learning Goals (list up to 10)					
• Understanding of cutting mechanism focused on cutting edge processes • Understanding additive manufacturing processes • Understanding process parameters and modelling					
Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)	
Student evaluation method/ grading					
• Lecture based …… The student has to attend the 2h practice part of the course and submit weekly assignments. • Reading course …… Additional reading material will be supplied and a personal project will be assigned. The course grade will be based on the final presentation of the project.					

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Course Title	CNC machine Tools				
ECTS	6	**Typical Semester**	7 (S and F)	**Hours/ Week**	5

Brief Description (5-6 lines)

Numerically controlled machine tools. Machine control unit (MCU). Tool positioning. Cutter location data. ISO programming. 'G-codes' machine language. 2-Axis CNC lathe programming (g codes and CAM programming). 3-Axis CNC milling machine (g codes & Heidenhain). 5- Axis machine center programming (g codes & shopmill). SolidCAM programming.
Lab: Practice on CNC machining. Manually input G-codes and CAM programming.

Main Learning Goals (list up to 10)

- Understanding of selective cutting material process using CNC machine tools
- Understanding of zero points, tool positioning, and g codes
- Understanding of CAM programming

Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)

Student evaluation method/ grading

- Lecture based ……
  The student has to attend the 2h practice part of the course and submit weekly assignments.
- Reading course ……
  Additional reading material will be supplied and a personal project will be assigned. The course grade will be based on the final presentation of the project.

Course Title	Internal Combustion Engines II				
ECTS	6	**Typical Semester**	7 (F)	**Hours/ Week**	5

Brief Description (5-6 lines)

Thermodynamic cycles: Otto, Diesel and Seiliger (mixed). Energy performance of ICE. Torque, power, energy efficiency, specific consumption, volumetric efficiency. Engine load. Resistance curve and driving cycle. Engine turbocharging. Thermal calculation and combustion stoichiometry. Engine dynamics. Gas and inertial forces on reciprocating and rotating parts. Balancing of single and multi-cylinder engine. Engine calculation examples.

Main Learning Goals (list up to 10)

- Understanding of energy fundamentals of internal combustion engines
- Introduction to engine kinematic and dynamic behavior

Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)

Student evaluation method/ grading

- Lecture based ……
  The student has to attend the 2h laboratory part of the course and submit weekly assignments.
- Reading course ….
  Additional reading material will be supplied and a personal project will be assigned. The course grade will be based on the final presentation of the project.

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Course Title	Renewable Energy Sources				
ECTS	6	**Typical Semester**	7 (F)	**Hours/ Week**	5

Brief Description (5-6 lines)

SOLAR ENERGY – THERMAL COLLECTORS. Solar radiation. Description and operating principles of a flat solar collectors. Overall energy balance of a flat solar collector. The concept of coverage. Calculation of thermal performance of a solar system using the "F Curves" Method. Solar cooling.
SOLAR ENERGY – PV. Overview of semiconductors and the photovoltaic effect. Efficient operation of PV modules. Autonomous and connected photovoltaic systems. Calculation of energy production. Applications of photovoltaic panels.
WIND ENERGY. Measurement and calculation of wind energy. Meteorological Statistics. Distribution curve of wind speed. Maximum power and kinetic energy on axis of wind turbines. Wind turbine characteristic curve. Calculation of average annual power generated by a wind turbine.
OTHER ENERGY SOURCES. Geothermal energy. Biomass.

Main Learning Goals (list up to 10)

- Introduction to Renewable Energy Sources and climate conditions
- Design of solar collector, PV and wind turbine installations.

Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)

Student evaluation method/ grading

- Lecture based ……
  The student has to attend the 2h laboratory part of the course and submit weekly assignments.
- Reading course ….
  Additional reading material will be supplied and a personal project will be assigned. The course grade will be based on the final presentation of the project.

Course Title	Steel Structures				
ECTS	6	**Typical Semester**	7 (F)	**Hours/ Week**	**4**

Brief Description (5-6 lines)

This course aims to introduce students to the design, analysis and performance estimation of steel structures. Steel's material properties, as well as its advantages and disadvantages compared to other materials are outlined. The performance of steel members under various loading combinations is presented. The course focuses on the provisions of Eurocode 3 (EN 1993-1-1) regarding steel members. Of particular importance is the application of the theoretical principles in practice.

Main Learning Goals (list up to 10)

- Acknowledgement of the basic applications of steel sections.
- Design of steel members based on the provisions of EN 1993-1-1
- Assessment of the performance of steel structures and proposal of strengthening/enhancement methods

Lecture based	**X**	**Reading course**	**X**	(mark with an "X" the appropriate box)

Student evaluation method/ grading

- **Lecture based ……**
  Students need to attend two 2h-long courses each week. The theoretical part of the course is presented, as well as its application in practice.
- **Reading course ….**
  Weekly study is required in order to keep up with the course material taught. Students are also expected to submit an overall project in which they apply in practice the course material taught.
  The final course grade consists 30% of the project grade and 70% of the final examinations score.