



**TECHNOLOGICAL EDUCATION
INSTITUTION (T.E.I.) OF CHALKIDA**

ECTS GUIDE

**FOR
THE DEPARTMENT OF**

MECHANICAL ENGINEERING

ACADEMIC YEAR 2008-2009

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1. General Information

According to the most recent law 2916/2001, and knowing the market requirements, the department has the aptitude of creating a new course programme, incorporating new elements in educational and research activities. The new program aims at the attainment of sufficient and at a high level education for our students mainly in specialised scientific and technical knowledge, so that the TEI of Chalkis graduates will be capable of successfully practicing their profession, in a highly competitive job market.

The graduates of our department are granted with a Mechanical Engineering degree of Tertiary Technological Education, which can activate itself in a widest spectrum of professional employment, state or private sector, as:

- 1.) In the industry:
 - a.) Maintenance of installations and equipment.
 - b.) Planning, installation and operation of productive systems.
 - g.) Organisation and administration of industrial enterprises.
 - d.) Safety of workers and installations.
 - e.) Control and guarantee of products quality.
- 2.) In technical offices:
 - a.) Study and manufacture of technical work.
 - b.) Development of technical studies mechanical and energy systems.
- 3.) In the shipping.
- 4.) In the aviation.
- 5.) In the education:
 - a.) Teaching.
 - b.) Research and development.
- 6.) In trade etc.

The Department today has roughly 2700 students. The educational staff of the department consists of 11 permanent members *E.P.* (Educational Personal) of all ranks, from which 7 are holders of doctoral diploma, with rich author's and researcher's work and 6 members of Technical Personnel. In development it is also the engagement of other of four permanent members *E.P.* For the cover of its functional needs, the Department occupies also capable number of teachers. Our Objective is the achievement of high education and services for our students during their studies, but also the certainty that the best supplies for a successful professional career after the completion of their study, was given to them. A sample of our success is that in the introductory examinations that take the graduates of various TEI at the *E.M.P.* (National Technical University of Athens) and other Universities of Greece, for the continuation of their studies, among the first succeeded where some of our Department graduates.

The Department organises International Congresses, meetings, special seminars and programs of training for the graduates of TEI and HIGHER EDUCATION INSTITUTIONS of Greece and abroad

aiming at the benefit of additional knowledge and development of modern technological achievements on subjects of specialisation. We are sure that with our common effort, the application of the new program of Study, but also with the suitable support of State, the Mechanical Engineering department of TEI Chalkis can and should dynamically claim the place that deserves in the academic community.

2. Degree

The degree conferred upon completion of the curriculum studies is equivalent to a Bachelor of Science (level 5A according to the UNESCO's ISCED classification system).

3. Duration and Structure of Studies

The duration of studies is eight semesters. In the first seven semesters, obligatory and elective courses in lecture form are offered in the above areas supported by laboratory and Applied Exercises sessions. Students are required to attend the lectures and the laboratory sessions, work on individual or team projects and present their results in oral and written form. In the final semesters, students are required to complete their senior project while in the last semester they must do their practical training with a company.

The senior project, compulsory for the completion of one's studies, is based on a topic selected by a student from a list of topics suggested by the teaching staff. It gives the student the opportunity to focus on a topic of their interest, to apply the knowledge and skills acquired during their studies, to participate in medium and large scale experiments, to become familiar with bibliographical research techniques, and apply their technical writing skills.

The practical training with a company, supervised by a member of the teaching staff, is also compulsory for the completion of their studies. It gives the students the opportunity to broaden their knowledge acquiring hands-on experience in real conditions, to familiarize themselves with labor laws and workplace safety procedures and to obtain information necessary for the completion of their senior project.

The Course Syllabus involves Obligatory (O), Obligatory Electives (OE) and Electives (E) that can be Theoretical (T), Laboratory (L) or Mixed (M) courses. According to their content they are classified in General Core (GC), Special Core (SC), Specialization (S) and Human Factors and Legislation Course (HFLC) courses.

The syllabus is structured based on the workload required by an average student ranging from 50 to 60 hours per week depending on the semester level. The hours of class attendance range from 25 to 27 per week depending on the semester. Each semester carries 30 ECTS units while the number of ECTS units of a course depends on the workload required by an average student.

The General and Special Core as well as the Specialization courses fall under one of the two Sectors of the Department:

- a) The Sector of Energy and
- b) The Sector of Constructions

The tables below show how the courses are classified.

TABLE 1 summarizes the structure of the course syllabus:

TABLE 1: SUMMARY OF COURSE SYLLABUS													
Semester	T	M	L	TOTAL	GC	SC	S	HFLC	TOTAL	H/W	% H/W	WL/W	%WL/W
1st	2	2	1	5	5	0	0	0	5	25	0,14	30	12,5
2 nd	1	3	2	6	3	3	0	0	6	27	0,15	30	12,5
3 rd	2	3	1	6	3	2	0	1	6	25	0,14	30	12,5
4 th	1	4	0	5	1	4	0	0	5	27	0,15	30	12,5
5 th	1	5	0	6	0	3	3	0	6	25	0,14	30	12,5
6 th	1	5	0	6	0	2	2	2	6	26	0,145	30	12,5
7 th	3	3	0	6	1	1	2	2	6	23	0,135	30	12,5
8 th	-	-	-	-	-	-	-	-	-	-	-	30	12,5
	11	25	4	40	13	15	7	5	40	178	100	240	100

H/W: Hours/Week, WL/W: Workload/Week

TABLES 2-5 classify the courses according to their category:

TABLE 2: GENERAL CORE COURSES				
	SEMESTER	COURSE TYPE	H/W	WL/W
MATHEMATICS I	1 st	T	6	9
MECHANICAL DESIGN I	1 st	L	4	3
ENGINEERING MECHANICS I	1 st	T	6	8
PHYSICS I	1 st	M	4	4
MATERIALS TECHNOLOGY	1 st	M	5	6
MATHEMATICS II	2 nd	T	5	8
PHYSICS II	2 nd	M	4	4
PROGRAMMING	2 nd	M	6	6
AutoCad DRAWING	3 rd	L	4	3
NUMERICAL ANALYSIS	3 rd	M	4	6
THERMODYNAMICS	3 rd	T	4	4
HEAT TRANSFER	4 th	T	4	5
ENGLISH TECHNICAL TERMINOLOGY	7 th	T	3	4
	TOTAL		59	70

TABLE 3: SPECIAL CORE COURSES				
	SEMESTER	COURSE TYPE	H/W	WL/W
MECHANICAL WORKSHOP	2 nd	L	3	3
MECHANICAL DESIGN II	2 nd	L	4	3
ENGINEERING MECHANICS II	2 nd	M	5	6
MACHINE ELEMENTS I	3 rd	M	5	7
FLUID MECHANICS	3 rd	M	5	6
MACHINE ELEMENTS II	4 th	M	5	6
HYDRAYLIC MACHINES I	4 th	M	5	6
INTERNAL COMBUSTION ENGINES I	4 th	M	6	5
MECHANICAL TECHNOLOGY	4 th	M	7	8
STEEL STRUCTURES	5 th	M	5	5
HYDRAYLIC INSTALLATIONS	5 th	M	4	5
ELECTRICAL ENGINEERING	5 th	M	5	5
STEAM TURBINES & BOILERS	6 th	M	5	6
ELECTRIC MACHINES	6 th	M	4	4
PLC- INDUSTRIAL AUTOMATION	7 th	M	6	8
TOTAL			73	83

TABLE 4: SPECIALIZATION COURSES				
	SEMESTER	COURSE TYPE	H/W	WL/W
TRAILER & TRANSFERRING MACHINES	5 th	M	5	5
PRODUCTION MANAGEMENT	5 th	M	6	6
WELDING TECHNOLOGY	5 th	T	3	4
FRACTURE MECHANICS	5 th	T	3	4
HYDRAYLIC MACHINES II	5 th	M	4	5
COOLING PROVISIONS	5 th	M	5	6
COMBUSTION-GAS-LUBRICANTS	5 th	T	3	4
WATER DESALINATION TECHNOLOGY	5 th	T	3	4
CALCULUS FLUID MECHANICS & AERODYNAMICS	5 th	T	3	4
CNC TOOLMACHINES	6 th	M	7	7
BIOMECHANICS	6 th	T	3	4
THEORY OF MACHINES & MECHANISMS	6 th	M	3	4
AIR-CONDITION & HEATING TECHNOLOGY	6 th	M	7	7
ENERGY PLANTS	6 th	T	3	4
CALCULATION METHODS OF TRANSMISSION PHENOMENA	6 th	T	3	4
STRUCTURES DESIGN	7 th	T	3	6
STRUCTURES ANALYSIS	7 th	T	3	4
STEAM TURBINES & BOILERS II	7 th	M	5	6
ALTERNATIVE ENERGY RESOURCES	7 th	M	3	4
INTERNAL COMBUSTION ENGINES II	7 th	M	3	4
GAS TURBINES	7 th	M	3	4
TOTAL			30	36

TABLE 5: HFLC COURSES				
	SEMESTER	COURSE TYPE	H/W	WL/W
LAW & WORKPLACE SAFETY	3 rd	T	3	4
BUSINESS ADMINISTRATION	6 th	T	2	3
QUALITY ASSESMENT & CONTROL	6 th	M	5	6
ECONOMIC-TECHNICAL ANALYSIS	7 th	T	3	4
ENVIRRONMENTAL PROTECTION	7 th	T	3	4
TOTAL			16	21

TABLE 6 presents the distribution of the lecture hours and the workload per course type:

TABLE 6: STATISTICS PER COURSE TYPE						
Total number of courses: 40	Total number of hours	WL	Course Type			
	178	240	G	SC	S	HFLC
	Number of courses		13	15	7	5
	Hours		59	74	30	16
	%		33	41,5	16,85	8,65
	Workload		70	83	36	21
	%		29,16	34,58	15	8,75

Finally, TABLE 7 summarizes the distribution of teaching hours in theoretical, laboratory and Applied Exercises sessions.

TABLE 7: HOUR DISTRIBUTION		
	H/W	%
THEORY	87	48,87
APPLIED EXERCISES	22	12,36
LABORATORY	69	38,77
TOTAL	178	100,0

4. Course Syllabus

The Mechanical Engineering course syllabus is summarised below.

FIRST SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	MATHEMATICS I	O	G	4	2	0	6	9	
2	PHYSICS I	O	G	2	0	2	4	4	
3	MATERIALS TECHNOLOGY	O	G	3	0	2	5	6	
4	MECHANICAL DESIGN I	O	G	0	0	4	4	3	
5	ENGINEERING MECHANICS I	O	G	4	2	0	6	8	
	TOTAL			13	4	8	25	30	
SECOND SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	MATHEMATICS II	O	G	4	1	0	5	8	
2	PHYSICS II	O	G	2	0	2	4	4	
3	PROGRAMMING	O	G	2	0	4	6	6	
4	MECHANICAL WORKSHOP	O	SC	0	0	3	3	3	
5	MECHANICAL DESIGN II	O	SC	0	0	4	4	3	
6	ENGINEERING MECHANICS II	O	SC	3	0	2	5	6	
	TOTAL			11	1	15	27	30	
THIRD SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	NUMERICAL ANALYSIS	O	G	2	0	2	4	6	
2	THERMODYNAMICS	O	G	2	2	0	4	4	
3	MACHINE ELEMENTS I	O	SC	3	0	2	5	7	
4	AutoCad DRAWING	O	G	0	0	4	4	3	
5	FLUID MECHANICS	O	SC	3	0	2	5	6	
6	LAW & WORKPLACE SAFETY	O	HFLC	2	1	0	3	4	
	TOTAL			12	3	10	25	30	

FOURTH SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	HEAT TRANSFER	O	G	2	2	0	4	5	
2	MACHINERY ELEMENTS II	O	SC	2	1	2	5	6	
3	HYDRAYLIC MACHINES I	O	SC	3	0	2	5	6	
4	INTERNAL COMBUSTION ENGINES I	O	SC	3	1	2	6	5	
5	MECHANICAL TECHNOLOGY	O	SC	2	1	4	7	8	
	TOTAL			12	5	10	27	30	
FIFTH SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	ELECTRICAL ENGINEERING	O	SC	2	1	2	5	5	
2	STEEL STRUCTURES	O	SC	2	0	2	4	5	
3	HYDRAYLIC INSTALLATIONS	O	SC	2	0	2	4	5	
CONSTRUCTIONS SECTOR									
4	TRAILER & TRANSFERRING MACHINES	O	S	2	1	2	5	5	
5	OPERATION MANAGEMENT	O	S	2	1	3	6	6	
6	WELDING TECHNOLOGY	OE	S	2	1	0	3	4	
7	FRACTURE MECHANICS	OE	S	2	1	0	3	4	
8	FINITE ELEMENTS	OE	S	2	1	0	3	4	
ENERGY SECTOR									
4	HYDRAYLIC MACHINES II	O	S	2	0	2	4	5	
5	COOLING PROVISIONS	O	S	2	0	3	5	6	
6	COMBUSTION-GAS-LUBRICANTS	OE	S	2	1	0	3	4	
7	WATER DESALINATION TECHNOLOGY	OE	S	2	1	0	3	4	
8	CALCULUS FLUID MECHANICS & AERODYNAMICS	OE	S	2	1	0	3	4	
	TOTAL			12	2	11	25	30	

SIXTH SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	QUALITY ASSESMENT & CONTROL	O	HFLC	2	1	2	5	6	
2	ELECTRIC MACHINES	O	SC	2	0	2	4	4	
3	STEAM TURBINES & BOILERS	O	SC	2	1	2	5	6	
4	BUSINESS ADMINISTRATION	O	HFLC	2	0	0	2	3	
CONSTRUCTIONS SECTOR									
5	CNC TOOLMACHINES	O	S	3	0	4	7	7	
6	BIOMECHANICS	OE	S	2	1	0	3	4	
7	THEORY OF MACHINES & MECHANISMS	OE	S	2	1	0	3	4	
ENERGY SECTOR									
5	AIR-CONDITION & HEATING TECHNOLOGY	O	S	3	0	4	7	7	
6	ENERGY PLANTS	OE	S	2	1	0	3	4	
7	CALCULATION METHODS OF TRANSMISSION PHENOMENA	OE	S	2	1	0	3	4	
TOTAL				13	3	10	26	30	

SEVENTH SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	PLC- INDUSTRIAL AUTOMATION	O	SC	3	1	2	6	8	
2	ENGLISH TECHNICAL TERMINOLOGY	O	G	2	1	0	3	4	
3	ECONOMIC-TECHNICAL ANALYSIS	O	HFLC	2	1	0	3	4	
4	ENVIRRONMENTAL PROTECTION	O	HFLC	2	1	0	3	4	
CONSTRUCTIONS SECTOR									
5	STRUCTURES DESIGN	O	S	3	0	0	3	6	
6	STRUCTURES ANALYSIS	OE	S	3	0	0	3	4	
ENERGY SECTOR									
5	STEAM TURBINES & BOILERS II	O	S	3	0	2	5	6	
6	ALTERNATIVE ENERGY RESOURCES	OE	S	2	0	1	3	4	

7	INTERNAL COMBUSTION ENGINES II	OE	S	2	0	1	3	4	
8	GAS TURBINES	OE	S	2	0	1	3	4	
	TOTAL			15	4	5	23	30	
EIGHTTH SEMESTER									
	COURSE	O/OE	Category	T H/W	AE H/W	L H/W	Total H/W	WL	ECTS PTS
1	PRACTICAL TRAINING	O		0	0	0	0	10	
2	SENIOR PROJECT	O		0	0	0	0	20	
	TOTAL			0	0	0	0	30	

Notation:

O=Obligatory course, **OE**=Obligatory Elective, **E**=Elective

G= General Core Course, **SC**= Special Core Course, **S**=Special Course

HFL= Human Factors and Legislation Course, **H/W** = Hours per Week **WL** = Work Load

T=Theoretical Course, **AE**= Applied Exercises, **L**=Laboratory Course

4.1 Course Description

First Semester

Title	MATHEMATICS I		
Semester	1st		
Department	General Department of Applied Sciences		
Category	G	Obligatory	
Type	Theoretical		
Hours/week	2 Lecture	2 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	9		
Prerequisites			
Learning Outcomes			
To provide the students with basic knowledge of the mathematics used in most of their courses.			
Syllabus			
The module is an introduction to differential and integral calculus covering differentiation and integration techniques using examples from the area of Mechanical Engineering. It also offers an overview of linear algebra with emphasis in matrices, determinants and the solution of linear systems. Finally, it offers an introduction to complex numbers and their operations.			
Recommended Reading:			
1. T. Apostol, Addison Wesley, Mathematical Analysis			
2. Noble, Applied Linear Algebra, Prentice Hall.			

Title	PHYSICS I		
Semester	1 st		
Department	General Department of Applied Sciences		
Category	G		G
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes:			
To provide the student with a global perception of Physics, with emphasis in field theory and its use in technological applications.			
Syllabus			
Principles and methods of physics, units, study of motion, forces, Newton's Law of Motion, conservation of energy, conservation of momentum, conservation of angular momentum.			
Recommended Reading:			
<ol style="list-style-type: none"> 1. Young H.D., Mechanic Thermodynamics, Physics, Volume A, Papazisi Publications, 1992 2. Halliday-Resnick –Krane, Physics, John Wiley and Sons, Inc, 1992 3. Muncaster R, A -level Physics, Stanley Thones Ltd, 1993 4. Berkeley University, Berkeley Physics course, McGraw Hill, 1985 			

Title	MATERIALS TECHNOLOGY		
Semester	1 st		
Department	General Department of Applied Sciences		
Category	G	Obligatory	
Type	Theoretical		
Hours/week	3 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites			
Learning Outcomes:			
The aim of this course is to gain the basic knowledge regarding the science of materials with emphasis in their electrical properties and their behavior in electric and electronic applications.			
Syllabus			
Introduction to materials science. Conductors. Semiconductors. Superconductors. Magnetics. Insulators. Technological application materials – Electrical application materials Resistors, coils, capacitors (properties and materials), electrical connections and contacts, semiconductor technology. Reliability of materials and devices.			
Recommended Reading:			
1. K.G. Budinski and M.K. Budinski, Engineering materials: properties and selection 2. L.H. Van Vlack, Elements of materials science and engineering			

Title	MECHANICAL DESIGN I		
Semester	1st		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Laboratory		
Hours/week	Lecture	Applied Exercises	5 Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites			
Learning Outcomes: The aim of this course is to gain the basic knowledge regarding mechanical design			
Syllabus Basic knowledge (instruments, design paper, drawer, lines) Elements of mechanical design (cylindrical cut, developments)			
Recommended Reading: 1. S. K. Bogolyubov, Mechanical Design, PLAISIO Publications, 1998.			

Title	ENGINEERING MECHANICS I		
Semester	1st		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Theoretical		
Hours/week	4 Lecture	2 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	8		
Prerequisites			
Learning Outcomes: To acquire the basic knowledge of a) statics of a rigid body b) dynamics and kinematics necessary in system modeling.			
Syllabus Introduction – Vector analysis – Force – Moment of a force – Equivalent systems of forces – Sum of forces – Free body diagram – Equilibrium of a particle in space - Equilibrium of a rigid body			
Recommended Reading: <ol style="list-style-type: none"> 1. F. Beer and E. Johnston, Vector Mechanics for Engineers, McGraw - Hill, New York. 2. W. Mc Lean and W. Nelson, Engineering Mechanics, Schaum's outline Series, McGraw - Hill, New York. 			

Second Semester

Title	ENGINEERING MECHANICS II		
Semester	2nd		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Mixed		
Hours/week	3 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites	ENGINEERING MECHANICS I		
Learning Outcomes:			
§ Understanding of basic concepts and principle:			
§ Rigid body, force, torque, kinds of support, equilibrium equations, frictions			
§ Dynamics, system of coordinates, velocity, acceleration, momentum, gravity, work, power, energy, impulse.			
Syllabus:			
§ Elements of vector summation, multiplication			
§ Equivalent systems of forces, force, tork.			
§ Center of mass and centroides.			
§ Frames, girder, axial force, bending moment, concetrated, distributed loads.			
Recommended Reading:			
1. F. Beer and E. Johnston, Mechanics of Materials, McGraw - Hill, New York.			

Title	MATHEMATICS II		
Semester	2nd		
Department	General Department of Applied Sciences		
Category	G	Obligatory	
Type	Theoretical		
Hours/week	4 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	8		
Prerequisites			
Learning outcomes	The aim of this course is the students to gain the knowledge to solve deferential equations, surface inderglace in order to use these principles in special cources		
Syllabus	<ul style="list-style-type: none"> - Linear Deferential equations of 1st and 2nd order (homogenous ,non homogenous) - Total deferential - Surface integrals of 1st and 2nd order 		
Recommended Reading:			
	Instructor's notes		

Title	PROGRAMMING		
Semester	2nd		
Department	General Department of Applied Sciences		
Category	G	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	4 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites			
Learning Outcomes:			
To introduce the students to the most commonly used computer operating systems and software packages used for data processing and reporting in engineering.			
Syllabus			
Principles, structure and operation of computers – hardware – software. Description of basic I/O devices. Number systems and conversions. Boolean algebra. Truth tables. Comparative study of various computer languages and design concepts. Design techniques and compilation of algorithms. Networks. Operating systems. Personal Computing. Word processing, spreadsheets, presentation software, use of Internet and electronic mail.			
Recommended Reading:			
Instructor's notes			

Title	MECHANICAL WORKSHOP		
Semester	2nd		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Laboratory		
Hours/week	Lecture	Applied Exercises	3 Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites			
Learning Outcomes:			
<ul style="list-style-type: none"> - Usage of the basic measuring instruments of mechanical workshop 			
Syllabus			
<ul style="list-style-type: none"> - Analysis of the operation of caliber and micrometer - Mechanical fitting (drill, screw cutter) 			
Recommended Reading			
Instructor's notes			

Title	MECHANICAL DESIGN II		
Semester	2nd		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Laboratory		
Hours/week	Lecture	Applied Exercises	4Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites			
Learning Outcomes: Drawing of composite mechanical components and part of machines			
Syllabus: Various kinds of cuts(horizontal, vertical, inclined,) Construction drawing, tolerances, symbols of surface treatment. Drawing of spirals. Drawing of gears, pulleys, keys and springs.			
Recommended Reading: Instructor's notes			

Third Semester

Title	NUMERICAL ANALYSIS		
Semester	3rd		
Department	General Department of Applied Sciences		
Category	G	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites			
Learning Outcomes:	Numerical analysis methods.		
Syllabus:	Mathematical computer methods of high level to resolve engineering problems.		
Recommended Reading:	<ol style="list-style-type: none">1. Stark, Introduction to Numerical Methods, McMillan2. L. Nyhoff, S. Leestma, Introduction to FORTRAN 90, 2001, ISBN 960-411-176-0		

Title	THERMODYNAMICS		
Semester	3rd		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Theoretical		
Hours/week	2 Lecture	2 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes:			
The creation of theoretical background for the study, analysis and optimisation of operation and energy behaviour of various thermal machines.			
Objectives of Course			
<ul style="list-style-type: none"> • Comprehension of significances Internal Energy, Enthalpy, Work, Heat, Entropy. • Knowledge of various forms of energy and their basic laws of transformation. • Knowledge of basic beginnings and ranks of Thermodynamics. • Faculty of Calculation of thermodynamic attributes for simple situations of balance. • Faculty of Energy sizes calculation for simple and complex changes. • Application of Mollier Diagrams in technical calculations. • Application of Steam Tables in special applications 			
Syllabus:			
Basic significances and definitions. Forms of Energy, First Thermodynamic Rank, Perfect gas, Circular changes, Carnot Circle of perfect gas, Reversible and not phenomena, Second Thermodynamic Rank, Carnot Circle of any working mean, Thermodynamic scale of temperatures, Entropy, Diagrams T-s and H-s (Mollier), Thermodynamic possibility, Theoretical entropy of mixture. Entropy of not reversible changes, Two-phase Thermodynamic and Steaming, diagrams. Tables of steams, Real gases, Thermodynamic representation of reversible activities, Joule-Thomson Strangulation, Constitutive equations (Equation VDW), Specific volume heat of real gases, Thermodynamic circles, One-dimensional flow. Nozzles. Thermodynamics of Mixes and Combustion.			
Recommended Reading:			
1 Y.Cengel, M.Boles, Thermodynamics for Engineers. Vol. A & B,			
2. H. C. Van Ness, McGraw-Hill, Introduction to Thermodynamics vol. 1&2 / J. M. Smith, 1990			
3. Adrian Bejan, Advanced Engineering Thermodynamics, John Wiley & Sons, 1997			
4. Richard E. Sonntag, Claus Borgnakke, Gordon J. Van Wylen, Fundamentals of Thermodynamics, John Wiley & Sons, 1997			
5 Joel Rayner, R. Joel,. Basic Engineering Thermodynamics, Addison-Wesley Pub Co, 1998			
6 William Z. Black and James G.Hartley, Thermodynamics, Harper Collins Publishers Inc. 1996			

Title	MACHINE ELEMENTS I		
Semester	3 rd		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	3 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	7		
Prerequisites	Mechanical Design I		
Learning Outcomes:	The presentation of the basic machine components and the analysis of their calculation		
Syllabus:	Bolts, welding, joints, springs, keys, couplings, rolling bearings, gernal bearings. Shafts. Strength calculations and deflections of variable area shafts. Bolts, bolt drives, clutches. Seals		
Recommended Reading:	Instructor's notes		

Title	AutoCAD DRAWING		
Semester	3 rd		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Laboratory		
Hours/week	Lecture	Applied Exercises	3 Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites			
Learning Outcomes: Drawing of simple mechanical components and mechanisms using computer			
Syllabus: The commands of the drawing program. Configuration of the drawing environment. Introduction to the modification of drawings. Advanced techniques of drawings. Improvement of the drawings shape.			
Recommended Reading: Instructor's notes			

Title	FLUID MECHANICS		
Semester	3 rd		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	3 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites			
Learning Outcomes:			
Basic principles of fluid mechanics. Hydrostatic forces, open duct flows.			
Syllabus:			
<ol style="list-style-type: none"> 1. Continuity assumption, properties of fluids 2. Dynamics of fluids, equations of motions 3. Initial and boundary value problems, similarity and vorticity. 4. Analytical solutions of classical fluid dynamic problems 5. Creeping flows, incompressible flows 6. High Reynolds number flows, laminar and turbulent boundary layer. 7. Turbulent flows 8. Wave phenomena in fluid dynamics 			
Recommended Reading:			
Instructor's notes			

Title	LAW & WORKPLACE SAFETY		
Semester	3 rd		
Department	Mechanical Engineering		
Category	HFLC	Obligatory	
Type	Theoretical		
Hours/week	2 Lecture	2 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes:			
The learning aims of this module are the comprehension of the basic safety rules in working environments and the environmental protection according to the currently applied legal framework. The application of relevant regulations in conventional industrial premises in combination with the relevant technical legal framework should be effectively learnt.			
Syllabus:			
Management and Organization of Job Safety. Risk avoidance methods. Safety of Buildings. Safety in transfers and freightage. Safety in electrical installations. Fire protection policy. Safety measures in welding techniques. Safety measures in using mechanical machinery. Health and Safety inspection systems for work environments. Control and Safety of dangerous substances. Inspections of noise levels. Lighting systems. Radiations. Ventilation of working environments. Dangerous materials and substances. Personal safety and first aids. Conduct and storage of materials. Legislation and regulations for safety at workplace. Introduction in environmental legislation, electromechanical projects, procedures, project commissions, technical enterprises.			
Recommended Reading:			
1. Kyriakopoulos, P., Technical Legislation, Syghroni Ekdotiki 2. Andreadis, P., Employment Security, ION Publications, 1997			

Fourth Semester

Title	HEAT TRANSFER		
Semester	4rth		
Department	Mechanical Engineering		
Category	G	Obligatory	
Type	Theoretical		
Hours/week	2 Lecture	2 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites			
<p>Learning Outcomes:The comprehension of principles that govern the various ways of heat transfer and the acquisition of required knowledge for the calculation of heat flow in simple and complex provisions.</p> <p>Course Goals Comprehension of significances: Heat transfer, heat flux, steady & unsteady heat transfer.</p> <ul style="list-style-type: none"> • Knowledge of basic ways of heat transfer (conduction, convection, radiation), their phenomenology and their basic laws. • Faculty of Calculation of steady Heat Transfer for simple and complex geometries considering only one way of heat transfer (e.g. conduction) • Faculty of Calculation of steady Heat Transfer for simple and complex geometries considering combined way of heat transmission (e.g. conduction, convection and radiation) • Faculty of Calculation of unsteady heat transfer for simple and complex geometries and provisions considering a way or combination of ways of heat transmission. • Application of Calculating Methods in technical calculations of heat transfer (e.g. exchangers, insulations). • Knowledge of heat transfer special applications (e.g. Ablation, Post-CHF Heat Transfer, Combustion Heat Transfer, Boiling Heat Transfer, Electronic Component Cooling). 			
<p>Syllabus:</p> <p>Theory Permanent conduction of heat in simple and complex solid bodies. Transient phenomena. Graphic and numerical methods. Optimal thickness of insulation. Convection. Theory of resemblance. Non-dimensional numbers Nusselt, Prandtl, Grashoff. Forced convection in the interior of pipes. Across in rolls and parallel in level bodies. Free convection in level and cylindrical bodies. Change of phase, condensation). Heat Exchangers, types, operation, LTDM. Cross flow, Counter flow, parallel flow, Heat exchangers with/without mixture of currents, NTU-Method, Principles of radiation. Laws of Max Planck, Stefan-Boltzmann, Kirchhoff, Wien.</p> <p>Applied Exercises Exercises that concern: Calculations of heat transfer in simple or complex provisions and for different materials with use of Tables or with the use of a PC. Calculations of the optimal thickness of insulation and the optimal geometry of exchanger.</p>			

Recommended Reading:

1. Eric M. Smith, Thermal design of heat exchangers: a numerical approach: direct sizing and stepwise rating, Wiley, 1997
2. J. P. Holman, Heat transfer, McGraw – Hill, 8th ed., 1997
3. Sadik Kakac, Hongtan Liu, Heat exchangers: selection, rating, and thermal design, CRC, 1998
4. Frank P. Incropera, David P. DeWitt, Fundamentals of heat and mass transfer, Wiley, 4th ed., New York, 1996
5. John C. Tannehill, Dale A. Anderson, Richard H. Pletcher, Computational fluid mechanics and heat transfer, Taylor & Francis, 1997.
6. Frank Kreith & Mark Bohn, Principles of Heat Transfer, University of Colorado

Title	MACHINE ELEMENTS II		
Semester	4rth		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites	MACHINERY ELEMENTS I		
Learning Outcomes: Presentation of basic elements of machines and analysis of their calculation			
Syllabus: Helical, Worm, Bevel and Other Gear Types. Helical gear tooth loads. Bending strength of helical gears. Worm gears. Worm gear strength, Bevel gears. Dynamic load for bevel gears. Brakes and clutches			
Recommended Reading: Instructor's notes			

Title	HYDRAYLIC MACHINES I		
Semester	4rth		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	3 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites	FLUID MECHANICS		
Learning Outcomes			
Calculation methods for pumps and water turbines in installations.			
Syllabus:			
Historic review of hydrodynamic machinery. Non dimensional numbers in fluid mechanics. Basic flow equations. Energy conservation. Manometric head and pressure rise in installations. Terminology of pumps. Calculation and design methods of pumps. Terminology of water turbines, Kaplan and Francis water turbines. Calculation and design methods of water turbines.			
Recommended Reading:			
Instructor's notes			

Title	INTERNAL COMBUSTION ENGINES I		
Semester	4rth		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	3 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites	THERMODYNAMICS		
Learning Outcomes			
Fundamental operating principles of internal combustion engines. Thermodynamic principles. Combustion chemistry and fuel chemistry. Spark ignition engines. Spark ignition engines. Compression ignition engines. Two stroke engines.			
Syllabus:			
<p>Fundamental operating principles of internal combustion engines. Historic review of development of internal combustion engines. Main characteristics of internal combustion engines.</p> <p>Thermodynamic principles. The ideal air standard Otto cycle. The ideal air standard Diesel cycle. The ideal air Dual cycle. Fuel-air cycles. Comparison between thermodynamic and mechanical cycles. Computer models for cycles modeling.</p> <p>Combustion chemistry and fuel chemistry. Pre-mixed combustion in spark ignition engines. Characteristics of gasoline. RON and MON numbers. Combustion in compression ignition engines. Characteristics of Diesel fuel. Engine emissions and hydrocarbon oxidation.</p> <p>Spark ignition engines. Combustion chambers. Catalysts and emissions from spark ignition engines. Ignition systems. Mixture preparation. Electronic control of engines.</p> <p>Compression ignition engines. Direct and indirect injection systems. Fuel injection equipment. Diesel engine emissions.</p> <p>Two stroke engines. Two stroke gas flow performance parameters. Scavenging systems. Large naval-type engine performance and technology.</p> <p>Turbo charging and Supercharging. Thermodynamics and aerodynamics of turbochargers. Practical consideration and systems when turbo charging spark ignition and compression ignition engines.</p>			
Recommended Reading:			
<ol style="list-style-type: none"> 1. J.B.Heywood, Internal Combustion Engines Fundamentals, McGraw Hill, 1998 2. Newton K., Steeds W., and Garret T.K., The motor vehicle, Butterworth Heinemann,1997 3. Richard Stone. ,Introduction to Internal Combustion Engines, MacMillan Press 1999. 			

Title	MECHANICAL TECHNOLOGY		
Semester	4rth		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	4 Laboratory
Workload/Week	12		
ECTS points	8		
Prerequisites			
Learning Outcomes			
Analysis of the formulation processes in cut tool machines (remove material) and formulation tool machines (plastic material deformation).			
Syllabus:			
Processes of material formulation by cutting in cut tool machines (lathe, fraise, drill). Basic parts of a cutting tool machine. Formulation processes in formulation tool machine. Basic parts of a formulation tool machine with plastic deformation. Basic theoretical principles of metal welding.			
Recommended Reading:			
1. S. Kalpakjan, Manufacturing processes for engineering materials 2. E.P. De Garmo, J.T. Black Materials and processes in manufacturing 3. M.C. Shaw, Metal cutting principles			

Fifth Semester

Title	ELECTRICAL ENGINEERING		
Semester	5 th		
Department	Electrical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites			
Learning Outcomes			
<p>-Components of electrical circuits their use and their applications</p> <p>-The understanding of the electrical circuits' components.</p>			
Syllabus:			
<ul style="list-style-type: none"> - Components of dc circuits - Laws of Ohm and Kirchhoff for dc circuits - Power in dc circuits - Methodology to resolve dc circuits - Thevenin theory for dc circuits 			
Recommended Reading:			
<ul style="list-style-type: none"> • Stephen J. Chapman, Electric Machines AC - DC, 3rd Edition, Tziola Publications, Thessalonica 2001 • Fitzgerald A. E., C. Kingsley, Jr., and S. D. Umans, Electric Machinery, 5th ed., New York: McGraw-Hill, 1990. • McRherson, George, An Introduction to Electrical Machines and Transformer, New York: Wiley, 1981. 			

Title	STEEL STRUCTURES		
Semester	5 th		
Department	Mechanical Engineering		
Category	SC	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites			
Learning Outcomes			
Basic knowledge and capability to design sizing using computer and constructing steel structures			
Syllabus:			
Historical Overview – Modeling criteria – methods of permissible voltage variations- methods of electric charges and electric resistance coefficients – electric charge types – steel variations and their qualities – leaks in multi-axis motion intensive conditions – factors influencing the mechanical reaction of charges and resistances torsion beam suspensions - steel bending and forming – factors influencing mechanical behaviors. Structural applications of theory in the lab through the development of simulated metallic constructions by the students in the format of mandatory coursework.			
Recommended Reading:			
1. Eurocode No 3: Design of steel structures, publ. E.C.			
2. Salmon C.G. and Johnson J.E., Steel structures: design and behavior, Harper and Row publishers, N.Y., 1980			
3. Narayanan R., Beams and Beam-Columns: Stability and Strength, Applied Science Publishers, London 1983.			

Constructions Sector

Title	HOISTING & TRANSPORTING ENGINES		
Semester	5 th		
Department	Mechanical Engineering		
Category	S	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites	ENGINEERING MECHANICS II		
Learning outcomes	Understanding of hoisting and transporting engines		
Syllabus:	Description of hoisting and transporting engines, self moving and steady. General drawing principles of machines. Calculation of hoisting and transporting engines		
Recommended Reading:	Instructor's notes		

Title	Operation Management		
Semester	5th		
Department	Mechanical Engineering		
Category	S	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	3 Laboratory
Workload/Week	10		
ECTS points	5		
Prerequisites	ENGINEERING MECHANICS II		
<p>Learning outcomes By the completion of the course the student should be able to apply the basic principles of design and operation of the production systems. In particular the successful student of the course should have:</p> <ul style="list-style-type: none"> • Ability to design and present a product and a process • Ability to apply techniques for the determination of the location of a production system. • Ability to design and control projects • Ability to evaluate the cost of a product and the capacity of a production system. • Ability to design and evaluate a work • Ability to control the inventory • The ability to understand the basic principles of the ergonomic design of a work position • Knowledge of the basic principles of equipment maintenance • Knowledge to apply new technologies in operations management • Ability to study the queuing line systems and other services systems 			
<p>Syllabus: Theory Historical study of operations management. Design-production of products and services Design of processes. Facilities layout. Facilities location. Forecasting and capacity design. Waiting line management. Job design and work measurement. Principles of ergonomics. Project management. Production cost and productivity improvements. Just- in-time systems. Inventory systems for independent and dependent demand. Equipment maintenance, techniques and diagnosis.</p> <p>Applied exercises Exercises and case studies of all the above subjects</p> <p>Laboratory Laboratory exercises concerning the use relevant software of the subjects of the theory, (Solver of Excel, TreePlan, Project Manager, DS for windows, etc). The laboratory includes the following exercises</p>			

Recommended Readings:

1. Nigel Slack et al., Operations management, Pitman Publishing, second edition, 1998.
2. Fourth Edition, James L. Riggs, Production systems, John Wiley and Sons, 1987.
3. R. B. Chase et al., Production and Operations Management, Eighth Edition, McGraw Hill, 1998.
4. Lee J. Krajewski, Operations management, Addison Wesley, Fifth Edition, 1999.
5. Chapman, Cooper, Page, Addison Wesley, Management for Engineers, Fifth Edition, 1987.
6. J. Monks, Operations management, McGraw Hill, Second Edition, 1996.
7. B. Render and J. Heizen, Principles of Operations management, Prentice Hall, 2000.
8. H. Noori and R. Radford., Production and Operations Management, McGraw Hill, 1994.
9. S.L. Narasimhan et al., Production Planning and Inventory control, Prentice Hall, 1994.
10. B.C. Punmia, K.K. Khandewal, Project planning and Control with PERT and CPM, Laxmi Publications, New Delhi 1987.
11. C.R. Asfahl, Industrial Safety and Health Management, 2nd Edition, Prentice Hall, 1990.
12. M. Helander, A Guide to the Ergonomics of Manufacturing, Taylor and Francis, 1998.
13. Dan Macleod, The Ergonomics Edge: Improving Safety, Quality and Productivity, Van Nostrand Reinhold, 1997.
14. D.D. Bedworth, J.E. Bailey, Wiley, Integrated Production, Control Systems, John & Sons, Inc., 1997.

Title	WELDING TECHNOLOGY		
Semester	5th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes			
Drawing of the welding procedure(selections method of materials, welding parameters in order to avoid errors leading to failure)			
Syllabus:			
Thermal phenomena during welding. Welding materials and electrodes. Quality control of welding(distractive and non distractive methods)			
Recommended Reading:			
1. Sacks, Raymond, Welding principles and practices 2. Kenyon, Basic welding and fabrication			

Title	FRACTURE MECHANICS		
Semester	5 th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes			
<p>The learning aim of this module is the students' acquisition of knowledge and skills which require to: a) dimension constructions demanding high reliability levels (e.g. aircraft constructions) without the reception of continuous means and b) estimate the endurance and life duration of constructions with discontinuities (e.g. micro-cracks, macro-cracks, pores and ducts, etc)</p>			
Syllabus:			
<p>Introduction- theory of resistance to fibrous fractures-material imperfections and fractures – Griffith's strain energy release analysis of cracked constructions- Irwin & Orowan's stress intensity analysis of cracked constructions – coefficients of voltage intensity- mixed fractures- the plastic deformation at the tip of a sharp crack - fracture criteria – fracture toughness – accumulation of failures due to the loss of strain energy – creep deformation in variable conditions of intensity - creep deformation rates depending on the magnitude of the applied stress and its duration. Applications of theory in lab exercises with the students conducting measurements in simulated, variable conditions of large cracks due to excessive temperature or charge intensity. Comparison of lab outcomes with relevant theoretical predictions, in the format of mandatory coursework.</p>			
Recommended Reading:			
<ol style="list-style-type: none"> 1. Pook L.P., Linear elastic fracture mechanics for engineers, Theory and applications, WIT press, 2000. 2. Khludnev A.M. and Kovtunencko V.A., Analysis of cracks in solids, WIT press 2000. 3. Brebbia C.A. and Selvadurai A.P.S., Damage and Fracture Mechanics VI, WIT press 2000. 			

Energy Sector

Title	HYDRAYLIC MACHINES II		
Semester	5th		
Department	Mechanical Engineering		
Category	S	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	5		
Prerequisites			
Learning outcomes			
<p>On completion of attending the module of Hydrodynamic Engineering II in the fourth semester of studies the students in the department of Mechanical Engineering will have attained the required scientific knowledge and skills which will enable them to be occupied in relevant industrial sectors dealing with the estimation, construction and regulation of turbines and pumps in minor hydroelectric projects (MHP). The students will also have the opportunity to develop the training and inspection methodologies of the particular systems and applications.</p>			
Syllabus:			
<ul style="list-style-type: none"> • Historical overview of minor hydroelectric projects • Hydrologic analysis, supply measurements • Configuration of minor hydroelectric projects •Dams • Spillways • Water turbines Pelton, Francis, Kaplan 			
Recommended Reading:			
<ol style="list-style-type: none"> 1. Bohl W., Stromungsmaschinen, I&II, Vogel – Verlag, 1995 2. Palfy Sandor O. und 9 Mitautoren: Wasserkraftanlagen, expert verlag 1991 3. Vischer, D.: Nutzen-Kosten-Analyse in der Wasserwirtschaft. ETH Zurich, Mitteilung Nr. 18 			

Title	COOLING PROVISIONS		
Semester	5th		
Department	Mechanical Engineering		
Category	S	Obligatory	
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	3 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites	HEAT TRANSFER		
Learning outcomes			
<p>The students of the Mechanical engineers department will have acquired the essential scientific knowledge and dexterities, in order to be occupied in sectors of particular object in level of calculation, manufacture and regulation of cooling provisions installations. The students will also have the ability of developing the methodologies of teaching and controlling, systems and applications. Finally, with the end of teaching of this course the students will be able to define and develop research activities in the following objects and sectors:</p> <p>Students will study and apply modern technological methods with regard to the systems applied in cooling provisions. They will be able to design, develop and supervise the operation of provisions. They will study and apply rules of safety in refrigeration installations. They will develop programs of teaching, scientific and researching interest with regard to cooling provisions. They will develop and apply software with regard to planning, studying and manufacturing, cooling provisions.</p>			
Syllabus:			
Theory			
Introduction- The significance of refrigeration. Cooling circle with compression of saturated steams Cooling with two refrigerants. Heat Pumps. Cooling Circle Analysis.			
Laboratory			
Working with pipes. Recognition of cooling provisions. Explanation of connections. Usage Demonstration of Manometers. Operation and necessity of control valves. Safe communication with the provision. Loading and Unloading the cooling provision. Creating vacuum in the cooling provision.			
Recommended Reading:			
<ol style="list-style-type: none"> 1. A.D.Althouse, Modern Refrigeration and Air Conditioning, The Goodheart-Willcox Comp.Inc. 1988 2. ASHRAE FUNDAMENTALS, 1981, 1983, 1985. 3. C.P.Arora, Refrigeration and Air Conditioning (in S.I units) 4. M. Gr. Vrachopoulos, Cooling Provisions 5. Recknagel- Sprenger Part 2: Air-Conditioning (59th Edition),1978 6. Thermodynamic and Transport Properties of Fluids, University of Strathclyde, Dep. Mechanical Engineering Energy Systems Unit 7. Bor-Bin Tsai & Horacio Perez-Blanco, Limits of Mass Transfer Enhancement in Lithium Bromide - Water Absorbers by Active Techniques 8. VDI WÄrmeatlas, Heat Transfer, 6th Edition 1993 			

Title	COMBUSTION-GAS-LUBRICANTS		
Semester	5 th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes			
<p>§ Introduction to the theory of Steam Engines and Steam Boilers</p> <ul style="list-style-type: none"> • Fuel arrangements of internal combustion firing • Understanding of basic principles of the combustion process – stoichiometry, storage and transfer of fuels 			
Syllabus:			
<ul style="list-style-type: none"> • Fuel classification according to their origin and natural condition. Chemical composition of fuels Κατάταξη καυσίμων με βάση την προέλευση και φυσική κατάσταση τους. • Fuel densities. Stoichiometry of combustion. Air-fuel ratio • Calorific value of fuels. Definition, empirical relations of affinity. Difference between higher and lower calorific values. • Gas fuels. Production, circulation, storage and use. • Liquid fuels. Origin and processing of oil products. • Liquid fuels. Production, circulation, storage and use. • Solid fuels. Mine coals, lignite, turf. Production, circulation, storage and use. • Quantitative calculations for ideal complete combustion (combustion equations, combustion stoichiometry for gas and liquid fuels- volume analysis, combustion stoichiometry for liquid and solid fuels – weight analysis • Burners, methodological types of combustion. Fuel stoichiometry types for fume combustion and extraction - Fuel-fume stoichiometry and generated amounts of heat. • Lubricants. Lubrication techniques. Definition and measurement of viscosity. Viscosity index. • Categorization of lubricants according to their origin and natural condition. Κατάταξη λιπαντικών με βάση την προέλευση και την φυσική κατάστασή τους. • Production, circulation and use of lubricants. 			
Recommended Reading:			
Instructor's notes			

Title	COMPUTATIONAL FLUID DYNAMICS		
Semester	5th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes			
The basic equations of Fluid Dynamics.			
Syllabus:			
<p>The basic equations of Fluid Dynamics. The equation of mass conservation. The conservation law of momentum equation. The conservation law of the energy equation. The Navier-Stokes equations. The Reynolds-averaged Navier-Stokes equations. The thin shear layer approximation. The boundary layer approximation. The Euler equations. The potential flow model.</p> <p>The concept of characteristic surfaces and wave-like solutions. Compatibility relations. Initial and Boundary conditions. The concepts of consistency, stability and convergence. The von Neumann method for stability analysis.</p> <p>The finite difference method. General methods for finite difference formulas. Implicit finite difference formulas.</p> <p>Finite volume and conservative discretization. Two-dimensional finite volume method.</p>			
Recommended Reading:			
<ol style="list-style-type: none"> 1. Fletcher C.A.J., Computational Techniques for Fluid Dynamics, Volumes 1&2, Springer Verlag, Berlin, 1998. 2. Anderson J.D. Jr., Modern Compressible Flow, Mc Graw-Hill, 1990. 3. Anderson J.D. Jr., Fundamentals of Aerodynamics, Mc Graw-Hill, 2nd Edition, 1990. 4. Anderson J.D. Jr., Computational Fluid Dynamics, Mc Graw-Hill, 1995. 5. Oosthuizen P.H., Compressible Fluid Flow, Mc Graw-Hill, 1997. 6. Hirsch, Ch. Computation of Internal and External Flows, Mc Graw-Hill, 1992. 			

Sixth Semester

Title	ELECTRIC MACHINES		
Semester	6th		
Department	Electrical Engineering		
Category	SC		O
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes			
Understanding the operation principles of electric machines			
Syllabus:			
<ul style="list-style-type: none"> -Operating principles of electric machines -DC Machines-specification -DC Engines -AC Machines-specification 			
Recommended Reading:			
<ul style="list-style-type: none"> • Stephen J. Chapman, Electric Machines AC - DC, 3rd Edition, TZIOLA Publications, Thessalonika 2001 • Fitzgerald A. E., C. Kingsley, Jr., and S. D. Umans. Electric Machinery, 5th ed. New York: McGraw-Hill, 1990 • McRherson, George. An Introduction to Electrical Machines and Transformers, New York: Wiley, 1981 			

Title	Quality control and quality assurance		
Semester	6th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	9		
ECTS points	6		
Prerequisites			
Learning outcomes			
<p>By the completion of the course the student should be able to apply the basic principles of quality control techniques, quality assurance standards and quality improvement techniques. . In particular the successful student of the course should have:</p> <ul style="list-style-type: none"> • Ability to understand the principles and philosophy behind the word quality. What are the dimensions of quality in relation with the cost of quality. • Knowledge of the basic principles of Statistics and probability. • Ability to create Quality control charts • Ability to apply Quality assurance (management) standards (ISO 9001 etc.) • Ability to improve quality, DOE etc. • Ability to apply the basic principles of Total Quality Management <p>Ability to apply the basic principles of HACCP standards and HAZOP analysis</p>			
Syllabus:			
<p>Theory Definition of quality dimensions and quality cost. Elements of Statistics and Probability concerning Quality Control. Quality Control System. Statistical process control for variables. Statistical process control for properties. Quality Control by acceptance sampling for properties. Quality Control by acceptance sampling for variables. Quality Control by acceptance sampling in production lines. Reliability. Quality improvement, Design Of Experiments. The use of PC's in Quality control. Quality Assurance. Total Quality management. Elements of HACCP and HAZOP.</p> <p>Applied exercises Exercises and case studies of all the above subjects</p> <p>Laboratory Laboratory exercises concerning the use of relevant software of the subjects of the theory, (Excel, Origin, VisiDaq etc.). Laboratory exercises in dimensional and surface metrology and the use of CMM machine.</p>			

Recommended Reading:

1. Nigel Slack et al., Operations management, Pitman Publishing, second edition, 1998.
2. Fourth Edition, James L. Riggs, Production systems, John Wiley and Sons, 1987.
3. R. B. Chase et al., Production and Operations Management, Eighth Edition, McGraw Hill, 1998.
4. Lee J. Krajewski, Operations management, Addison Wesley, Fifth Edition, 1999.
5. Chapman, Cooper, Page, Addison Wesley, Management for Engineers, Fifth Edition, 1987.
6. J. Monks, Operations management, McGraw Hill, Second Edition, 1996.
7. B. Render and J. Heizen, Principles of Operations management, Prentice Hall, 2000.
8. H. Noori and R. Radford., Production and Operations Management, McGraw Hill, 1994.
9. S.L. Narasimhan et al., Production Planning and Inventory control, Prentice Hall, 1994.
10. B.C. Punmia, K.K. Khandewal, Project planning and Control with PERT and CPM, Laxmi Publications, New Delhi 1987.
11. C.R. Asfahl, Industrial Safety and Health Management, 2nd Edition, Prentice Hall, 1990.
12. M. Helander, A Guide to the Ergonomics of Manufacturing, Taylor and Francis, 1998.
13. Dan Macleod, The Ergonomics Edge: Improving Safety, Quality and Productivity, Van Nostrand Reinhold, 1997.
14. D.D. Bedworth, J.E. Bailey, Wiley, Integrated Production, Control Systems, John & Sons, Inc., 1997.

Title	Steam Boilers - Steam Turbines I		
Semester	6th		
Department	Mechanical Engineering		
Category	SC	O	
Type	Mixed		
Hours/week	2 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites			
Learning outcomes			
<ul style="list-style-type: none"> • Understanding of Boilers and Turbines. • Understanding of principles of operation and available types of boilers. • Evaluation of the boilers' size, the total efficiency of the boiler, as well as the efficiency of various parts of the plant. • Selection of the type of the boiler for the production of steam and water. • Understanding of particular fuel characteristics. • Understanding of types of burners and description of their operation for solid, liquids and gases fuels. • Selection of suitable burners and description of the methodology for their adjustment. • Evaluation of combustion quality for gaseous, liquid and solid fuels and analysis of the resulting flue gas. • Description of the process of steam production and classification of steam boilers. • Evaluation of steam boilers efficiency and parametric evaluation of steam boilers efficiency. • Study of steam superheaters, water preheaters and air preheaters. • Understanding of manufacturing procedures for water and steam boilers. 			

Syllabus:

- steam production procedures
- Classification of steam boilers
- Types of steam boilers
- Steam boiler efficiency
- manufacturing components for boilers
- Types of superheaters and reheaters
- Superheated and reheated steam temperature adjustment
- Heat transfer study for superheaters and reheaters
- manufacturing components for superheaters and reheaters
- Types of turbines
- Velocity triangles
- turbine performance at full and partial load
- assembly parts of steam turbines
- Types of water preheaters
- study of water preheaters
- manufacturing components for water preheaters
- Types of air preheaters
- study of air preheaters
- manufacturing components for air preheaters.
- Types of Cooling Towers
- Contribution of condenser to total efficiency

Applied Exercises

- Examples of calculations for all the above power plant components

LABORATORY

- Determination of Boiler efficiency with direct and indirect method.
- Determination of turbine efficiency
- Determination of Power Plant efficiency.
- Flue gas analysis and excess air determination
- Determination of boiler draught
- Determination of flue gas quality and the rejected heat
- burner control
- Types of heat exchangers
- temperature data acquisition in various steam boiler parts
- Thermotechnical study of the boiler

Recommended Reading:

- 1 N. Papageorgiou, STEAM GENERATORS I & II , Simeon Publications
- 2 Thomas C. Elliott, Kao Chen, Robert C. Swanekamp, Standard Handbook of Power plant Engineering, McGraw Hill, 2nd Edition
- 3 Everett B. Woodruff, Herbert B. Lammers, Thomas F. Lammers, Steam Plant Operation, McGraw Hill, 8th Edition
- 4 Training Handbooks MOTOR OIL (GREECE) – 4 Volumes, Corinthus 2005
- 5 Notes for the Laboratory of Steam boilers - Steam Turbines & Thermal Plants, TEI Chalkis.
- 6 Notes of Laboratorial Exercises of Laboratory of Steam boilers - Steam Turbines & Thermal Plants, TEI Chalkis.

Title	BUSINESS ADMINISTRATION		
Semester	6 th		
Department	Mechanical Engineering		
Category	HFLC	O	
Type	Mixed		
Hours/week	2 Lecture	Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites			
Learning outcomes			
Understanding of fundamental principles and processes towards the effective management of businesses.			
Syllabus:			
Fundamental principles of management. Basic principles in economics. Organization models in management, business models and characteristics of product and service corporations. Human resource management issues, managerial and peer behaviors, efficient staff development. Management conditions, prevention, personal safety, ways out. Effective management methods. Cost analysis, budgeting. Product cost, productivity. Modern trends in business and management. Information technology in business.			
Recommended Reading:			
Instructor's notes			

Constructions Sector

Title	CNC TOOLMACHINES		
Semester	6 th		
Department	Mechanical Engineering		
Category	S		O
Type	Mixed		
Hours/week	3 Lecture	Applied Exercises	4 Laboratory
Workload/Week	12		
ECTS points	7		
Prerequisites	MECHANICAL TECHNOLOGY		
Objective:	<ul style="list-style-type: none"> Modeling of CNC lathe and CNC fraise processing (configuration of G Code programme, introduction to CAD/CAM computer programming). 		
Syllabus:	Numerical inspection systems (axes definition, accuracy of processing, inspection of tool placements, examination of cutting parameters, tool assembling, etc). G and EIA/ISO communication codes. Computerized applications with the use of all the functioning commands of the tool for CNC lathe and CNC fraise machinery.		
Suggested Readings:	Instructor's notes		

BIOMECHANICS

Title	THEORY OF MACHINES & MECHANICS		
Semester	6 th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Mixed		
Hours/week	3 Lecture	Applied Exercises	4 Laboratory
Workload/Week	12		
ECTS points	7		
Prerequisites			
Learning outcomes:	<ul style="list-style-type: none"> • Design of CNC lathe processes and CNC milling machines (programme constitution in G code, introduction to the use of CAD/CAM programmes) 		
Syllabus:	Numerical control Systems (definition of axes, process accuracy, inspection of tool placement, inspection of cutting parameters, tool assembling, binding of processed parts. G and EIA/ISO communication codes. Programming applications using the tool machine instructions of lathes and milling machines CNC.		
Recommended Reading:	Instructor's notes		

Title	AIR-CONTIONING & HEATING TECHNOLOGY		
Semester	6 th		
Department	Mechanical Engineering		
Category	S	O	
Type	Mixed		
Hours/week	3 Lecture	Applied Exercises	4 Laboratory
Workload/Week	12		
ECTS points	7		
Prerequisites			
Learning Outcomes:			
<p>The Mechanical Engineering department students will acquire the appropriate scientific knowledge & skills, so as to be occupied in sectors of particular object in level of calculation, manufacture and regulation of air conditioning installations. The students will also have the ability of developing the methodologies of teaching and controlling systems and applications. Finally, with the end of this course the students will be able to define and develop research activities in the following objects and sectors:</p> <p>They will study and apply modern technological methods with regard to the systems applied in air conditioning installations. They will be able to design, develop and supervise the operation of installations. They will study and apply rules of safety in air conditioning installations. They will develop programs of teaching, scientific and research interest with regard to air conditioning installations. They will develop and apply software with regard to planning, studying and manufacturing air conditioning installations. The special objectives of course are all gathered, in the detail analysis of individual chapter contents. The constitution of special objectives is essential for the planning of, the course teaching and the educational notes but also for the evaluation of students.</p>			
Syllabus:			
<p>Introduction – Psychometrics, Meteorology, Loads. Solarise- Shading. Condenser systems. Ventilators - Piping -Air-conditioning devices. Heat pumps. Combustion, steam boilers, pre-heaters. Cooling device energy balance in an experimental air-conditioning unit.</p> <p>Measurement of air-speed and air-flow in experimental ventilator. Psychometric Changes. Types and methodology of central heating. Regulations. Systems Methodology and available types of boilers. Exhaust gas Analysis. Heat Exchangers. Combustors control.</p>			
Recommended Reading:			
<ol style="list-style-type: none"> 1. M. Gr. Vrachopoulos, Air-Conditioning, Edition 2000 2. K. Lefas, Ventilation & Air-Conditioning, 11/1991 3. Heating – Air Conditioning Part 1st. Recknagel – Sprenger. 4. K. Antonopoulos, Air-Conditioning, N.T.U.A Publications 5. Handbook of Air Conditioning System Design. Carrier. McGraw Hill, 1989 6. ASHRAE APPLICATIONS, 1982 7. Operating Manual of 1 & 2 Stages Absorption Chillers YORK, Ind 8. K. Paspalas, Heat Transfer, P 1993. 9. B. Selountos, Heating & Air-Conditioning (2 parts) 			

Title	ENERGY PLANTS		
Semester	6 th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Objective:			
<ul style="list-style-type: none"> • Comprehension of Energy Plants • Calculating Energy Plants. 			
Syllabus:			
<ul style="list-style-type: none"> • Calculations - Planning and dimensioning of installations: powerful currents, fuels network (liquids, gases and solid), networks of water and steam, Substations, activities and heat exchangers • Planning of Boiler rooms. Choice of boiler - methodology of boilers regulation, Choice of Materials. • Systems of automatism and operation control of installations. Safety systems of installations. • Fire protection networks and fire detection systems. • Weak Currents and Control of installations. • Energy Evaluation of Buildings and Industries (Energy Audit). • Application of European Community Directives on reduction of energy consumption. Energy identity of buildings. 			
Suggested Readings:			
Steam Boilers Laboratory notes			

Title	CALCULATION METHODS OF TRANSMISSION PHENOMENA		
Semester	6 th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes	To introduce the students to the philosophy of the numerical resolution of IT-supported transmission processes, to indicate its importance in the design of modern technological applications and bring them into contact with relevant empirical studies.		
Syllabus:	Introduction to transmission phenomena. Mention to equations related to phenomena of thermal and mass transmission. Introduction to the methodology of Finite Differences. Application of the fundamental methods of velocity rates in selected equations – models. Temporary transmission phenomena. Numerical modeling of radiation phenomena and terms in equations. Advanced applications including the methodology of numerical resolution as a “black box”. Mention to the numerical resolution of Laplace’s equation at two dimensions. Application/ correlations of numerical methods of modeling invented towards the resolution of heat transmission phenomena into phenomena encompassing mass transmissions. Applications – Topics: a) numerical resolution of Laplace equation at two dimensions (model of undeviating heat transmission through diffusion); b) numerical resolution of Laplace’s equation with reference to basic concepts of geometry in the two dimensions		
Recommended Reading:	1. Y. Jaluria, K.E. Torrance, Computational Heat Transfer, Hemisphere Publishing Corporation, 1986. 2. J.C. Tannehill, D.A. Anderson, R.H. Pletcher, Computational Fluid Mechanics and Heat Transfer, 2nd Edition, 1997. 3. R.B. Bird, W.E. Stewart, E.N. Lightfoot, Transport Phenomena, John Wiley & Sons, 1976.		

Sixth Semester

Title	PLC-INDUSTRIAL AUTOMATION		
Semester	6th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	3 Lecture	1 Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	8		
Prerequisites			
Learning Outcomes:			
<ul style="list-style-type: none"> •Introduction to industrial dynamic systems (mechanical, hydraulic, electric, thermal, etc) Understanding of the structure and functionality of natural dynamic systems, modeling and simulation of natural processes. 			
Syllabus:			
Introduction to dynamic systems, analysis of industrial linear processes on a time and frequency continuum, simulation principles. Differentiation of continuous time systems. Design of industrial inspection systems. Introduction to multidimensional processes. General characteristics of sensors, temperature, flow rate and velocity sensors. Differentiation of continuous time systems. Introduction to multidimensional processes, desynchronisation processes. Architecture of checkers, ergonomics, reliability. Adjustments of controllers. Manufacturing applications of automated control systems. Indicative applications: Automated control systems for metal cutting systems. Robots, respirators, greenhouses. Analysis and simulation of automobile brake systems, design of hydraulic engine control system, analysis and inspection of screw machines. Applications of binary control processes in lighting systems, engines etc.			
Recommended Reading:			
Instructor's notes			

Title	ENGLISH TECHNICAL TERMINOLOGY		
Semester	6 th		
Department	General Department of Applied Sciences		
Category	G	O	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes:			
<ul style="list-style-type: none"> • Analysis, understanding and use of technical terminology in the area of mechanical engineering. 			
Syllabus:			
<p>This module aims at the students' acquisition of technical English knowledge in the area of mechanical engineering at an advanced level of competence. By the end of the course the students will be able to read and understand complex material in technical books and academic journals and write technical reports and articles in English. Also they will be able to develop their ideas and synthesize their knowledge in oral and written format. Finally they will be able to use specialized English bibliography in their area of scientific expertise.</p>			
Recommended Reading:			
<ol style="list-style-type: none"> 1. Peppas, I., (2007), English For Engineers, Lefki Papacharalambous (Eds), Ellin Publications 2. English for Computer Science. By Charles Brown. 3. The advanced Learner's dictionary of current English – Oxford Publications. 			

Title	ECONOMIC TECHNICAL ANALYSIS		
Semester	6th		
Department	Mechanical Engineering		
Category	HFLG	O	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Objective:			
<p>The introduction to the basic principles of the financial management.</p> <p>The learning of how to collect and process necessary data for economic technical analysis</p> <p>The ability of students to implement the above for the development of realistic economic technical studies.</p>			
Course Description:			
<p>Basic principles of economic policy. Basic principles of financial management. Introduction to business plans-feasibility studies. Pre-feasibility studies. Data collection, guidelines and alternative solutions for economic technical studies. The use of pcs in the development of such studies. Examples of economic technical studies. Evaluation of feasibility studies.</p>			
Suggested Readings:			
<p>1. K. Karvounis, 'Economic Technical Studies, Stamoulis Editions, Athens,2001</p> <p>2. Irini Milioti, Economic Technical Analysis, Sigrioni Editions, 1998.</p>			

Title	ENVIRROMENTAL PROTECTION		
Semester	6 th		
Department	General Department of Applied Sciences		
Category	HFLG	O	
Type	Theoretical		
Hours/week	2 Lecture	1 Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes	This module aims at the understanding of fundamental principles of environmental protection according to the abiding legislation and practice. The application of these regulations in conventional industrial premises is studied.		
Syllabus:	Water quality, natural, chemical and mechanical processes of water purification. Air quality and natural, chemical and mechanical processes of air purification. Sewage recycling and recovery systems. Studies of environmental consequences.		
Recommended Reading	1. N.K. Ostler, Ed., Introduction to environmental technology, Prentice Hall, 1996.		

Constructions Sector

Title	STRUCTURE DESIGN		
Semester	6 th		
Department	Mechanical Engineering		
Category	S	O	
Type	Theoretical		
Hours/week	3 Lecture	Applied Exercises	Laboratory
Workload/Week	12		
ECTS points	3		
Prerequisites	MECHANICAL TECHNOLOGY		
Learning Outcomes:			
<ul style="list-style-type: none"> • Ideal modeling of mechanical devices performing specific functions. 			
Syllabus:			
Introduction to fundamental principles of construction design. Functional configurations. Solution approach methods. Technical and financial evaluation. Composition of structural designs. Study plans for different material categories (cast, welded, pressed, or shaped on cutting machines). Assembling design. Manufacturing adjustments for productivity and assembly cost reduction. Introduction to computational packages of structural designs.			
Recommended Reading:			
<ol style="list-style-type: none"> 1. G. Pal, W. Beitz, Engineering design 2. M.J. French, Conceptual design for engineers 			

Energy Sector

Title	Steam Boilers - Steam Turbines II		
Semester	6th		
Department	Mechanical Engineering		
Category	S	O	
Type	Theoretical		
Hours/week	3 Lecture	Applied Exercises	2 Laboratory
Workload/Week	12		
ECTS points	6		
Prerequisites			
Learning Outcomes:			
<ul style="list-style-type: none"> • Understanding of Thermal Plants operation • New available technologies of combustion optimization and Energy production • Anti-pollution Techniques – Emission and immission Measurements 			
Syllabus:			
THEORY			
§ Thermotechnical studies for various parts of Thermal Plants. Design of Power Plants			
§ New Technologies in Electricity generation. Hypercritical Boilers, combined cycle Power Plants, fluidized bed, IGCC Power Plants.			
§ Contemporary aspects of boiler and turbines. Retrofit of existing Power Plants			
§ Anti-pollution Techniques (Cyclones, Bag filters, Electrostatic Precipitators, etc).			
§ Application of DIN 1942 and DIN 1943 Standards for Power Plant acceptance test, e.g. boilers and turbines			
Applied Exercises			
§ Measurements in large Power Plants consuming various types of fuels.			
§ Application of Vdi-Richtlinien directives in measurements campaign.			
Recommended Reading:			
1. N. Papageorgiou, STEAM GENERATORS I & II, Simeon publications			
2. Thomas C. Elliott, Kao Chen, Robert C. Swanekamp, Standard Handbook of Power plant Engineering, McGraw Hill, 2nd Edition			
3. Everett B. Woodruff, Herbert B. Lammers, Thomas F. Lammers, Steam Plant Operation, McGraw Hill, 8th Edition			
4. Training Handbooks MOTOR OIL (GREECE) – 4 Volumes, Corinthus 2005			
5. TEI Chalkis, Notes for the Laboratory of Steam boilers - Steam Turbines & Thermal Plants.			
6. TEI Chalkis, Notes of Laboratorial Exercises of Laboratory of Steam boilers - Steam Turbines & Thermal Plants.			

Title	Alternative Energy Resources		
Semester	6th		
Department	Mechanical Engineering		
Category	S		OE
Type	Theoretical		
Hours/week	2 Lecture	Applied Exercises	1 Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes:			
<p>Description of Alternative Energy resources technologies and the repercussions of their application. Definition, characteristic sizes. Definition, description and choice of types of Alternative Energy Resources.</p> <p>Description of passive systems of exploitation. Calculation of economico-technical elements of systems. Optimisation of Conventional systems aiming at energy saving. Briefing on applications of energy saving in existing provisions and installations. Definition and calculation of economico-technical characteristics of completed systems. Application of calculating programs of size determination concerning the above objects.</p>			

Syllabus:**Theory**

The energy problem, the energy crisis at international and national level. Environmental profits and repercussions of renewable energy. Solar energy, water and air collector, applications. Bioclimatic planning of buildings. Aeolian energy: Wind generators. Waterfalls: Small hydroelectric plants. Geothermic. Solar panel systems, practical applications. Biomass. Energy exploitation of agricultural by-products and waste. Expectations, restrictions and problems in their exploitation. Energy saving: Possibilities, Technologies, Economic Evaluation of investments for energy saving (Simple time of settlement, present value etc). Application in industry and buildings. Improvement of Boiler efficiency - Boilers heat insulation: insulation materials and techniques. Economic insulation thickness of level and cylindrical wall. Energy saving in industry and buildings. Energy saving interventions in buildings and industries with program of tidying up, Energy saving in the electric charges and management of charges with DSM techniques. New industrial activities that achieve Energy Saving (use of ultrasounds, condensation in void, etc.).

Laboratory

Measurement of solar radiation. Measurement of committed solar radiation in level collector. Measurements of yields of system of storage of hot thermal energy. Heating and refrigeration of spaces with solar energy exploitation systems. Operating simulation of a solar-thermal energy system (Code **SOLSIM**). Measurements of solar panel system efficiency. Measurement and treatment of wind measurements. Measurement of produced electric energy from a wind generator installation. Designing of wind generator runner. Specification and choice of electromechanical equipment of wind generator. Combustor of biomass, determination of yield, stoichiometry of combustion. Calculating application of biomass installation. Measurement of subsoil temperature field and calculating simulation of thermodynamic characteristics distribution. Natural problem and mathematic simulation, applications, estimation of possibilities. Systems of air conditioning with geothermal energy. Measurements and determination of yield. Economico-technical analysis of geothermal energy exploitation systems. Numerical application.

Recommended Reading:

1. E.H.Vazaios. Solar Energy Applications. Phoebus Publications
2. G. Beryeles, Wind Generators. N.T.U.A Publications
3. K. Kagarakis, Photovoltaic energy. Symmetry Publications.
4. M. Fytikas. Geothermal Energy. A.U.T Publications.
5. Dr. Jan F. Kresder and Dr. Frank Kreith, Solar Energy Handbook, Photovoltaic Solar Energy Conversion Systems.
6. M. Buresch. Photovoltaic Energy Systems, McGraw Hill, 1989
7. Rybach, L. and Hopkirk, R., Shallow and deep borehole heat exchangers - Achievements and prospects, World Geothermal Congress, Florence, 1995
8. Gourieres D., Wind power plants - Theory and design,
9. Athens Environmental control programme, Technical report Volume IV - Edition 1980
10. Building Constructions, Heinrich Schmitt - Andreas Heene., Second Edition 1988
11. Weather, G. J. Makris, 1990

Title	INTERNAL COMBUSTION ENGINES II		
Semester	6th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	2 Lecture	Applied Exercises	1 Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning Outcomes:			
<p>Mechanical design considerations. Dynamic balance systems of crankshaft. Vibration of crankshafts.</p>			
Syllabus:			
<p>Mechanical design considerations. The disposition and number of cylinders. Cylinder block and head materials. The piston and rings. The connecting-rod, crankshaft, camshaft and valves. Calculation of piston velocity and acceleration. Calculation of forces acting on piston, connecting-rod and bearings. Calculation of torsion force and moment of the crankshaft. Dynamic balance systems of crankshaft. Balancing of crankshafts of in-line engines. Balancing of V-engines. Vibration of crankshafts. Eigenvalues and eigenmodes of crankshafts. Experimental facilities of internal combustion engines. Dynamometers. Fuel-consumption measurement. Air flow rate measurement. Temperature and pressure measurement. In-cylinder pressure measurement. Energy balance estimation.</p>			
Recommended Reading:			
<ol style="list-style-type: none"> 1. V.Ganesan, Internal Combustion Engines, McGraw Hill, 1994 2. The Internal Combustion Engine in Theory and Practice, Vol. 1 & Vol. 2, C. F. Taylor, The MIT Press, 1972 3. H.Heisler, Advanced Engine technology, Arnold, 1995 4. Haile J., Motorcycle turbo charging, supercharging & nitrous oxide, Whitehorse Press, 1997 5. Ferguson C.R., Internal Combustion Engines, Applied Thermosciences, Kirkpatrick A.T., John Wiley & Sons, 2000 6. Richard Stone, Introduction to Internal Combustion Engine, MacMillan Press 1999. 			

Title	TURBOMACHINERY		
Semester	6th		
Department	Mechanical Engineering		
Category	S	OE	
Type	Theoretical		
Hours/week	2 Lecture	Applied Exercises	1 Laboratory
Workload/Week	12		
ECTS points	4		
Prerequisites			
Learning outcomes			
Description and historic review of gas turbines.			
Syllabus:			
Description and historic review of gas turbines. Description of compounds of gas turbines. Gas turbines for aircraft propulsion and for power plants. Thermodynamic diagrams of cycles. Ideal Brayton cycle. Cycle efficiency and work output. Simple cycle with exhaust heat exchanger. Reheat cycle. Cycle with intercooled compression. Complex cycles. Compressor and turbine efficiencies. Heat exchanger pressure ratio. Design point and performance calculation. Performance curves of compressors and turbines. Theory of axial flow compressors. Velocity triangles and degree of reaction. Free-vortex theory. Simple blade design method. Compressor blade cascade tunnel and typical test results. Overall performance of compressor stage. Theory of axial flow turbines. Free-vortex theory. Degree of reaction of turbine stage. Single stage turbine design using the free-vortex theory. Turbine blade cooling techniques. Internal and external cooling.			
Recommended Reading:			
<ol style="list-style-type: none"> 1. V.Ganesan, Internal Combustion Engines, McGraw Hill, 1994 2. The Internal Combustion Engine in Theory and Practice, Vol. 1 & Vol. 2, C. F. Taylor, The MIT Press, 1972 3. H.Heisler, Advanced Engine technology, Arnold, 1995 4. Haile J., Motorcycle turbo charging, supercharging & nitrous oxide, Whitehorse Press, 1997 5. Ferguson C.R., Internal Combustion Engines, Applied Thermosciences, Kirkpatrick A.T., John Wiley & Sons, 2000 6. Richard Stone, Introduction to Internal Combustion Engine, MacMillan Press 1999. 			

4.2 Language

All courses are taught in Greek except from the English language module.

4.3 Final exams - Evaluation Procedures

Students' performance in purely theoretical courses or in the theoretical aspect of mixed courses is evaluated through written examinations at the end of the semester. Optionally, there can be mid-term exams.

In a laboratory course, students' performance is assessed regularly with a relevant written report at the end of each lab session while there is also an overall assessment at the end of the semester.

For their practical training students' assessment is largely based on their employer's report which is concerned mainly with the conscientiousness and competence of the trainee; this one is a Pass/Fail course.

The progress of a senior project is monitored and evaluated by a supervising academic who assesses the performance of the student while working on it, the final outcome, and the student's presentation/oral examination before a three-member committee.

4.4 Academic calendar

Fall semester: September 29, 2008 - January 16, 2009

Exam period 1: January 26, 2009 – February 6, 2009

Exam period 2: February 9, 2009 – February 20, 2009

Spring semester: March 3, 2009 – June 12, 2009

Exam period 1: June 22, 2009 – July 3, 2009

Exam period 2: September 1, 2009 – September 14, 2009

Official Holidays

October 28 th	National Holiday
November 17 th	School Holiday
January 30 th	School Holiday
March 25 th	National and Religious Holiday
May 1 st	Official Holiday

During Christmas and Easter holidays no classes are held for one week in each holiday.

4.5 ECTS coordinator

Dr Michael Vrachopoulos, Professor, tel.: , e-mail: mvrachop@teihal.gr.

5. Department of Foreign Languages

5.1 General Information

The department of Foreign Languages offers courses in four foreign languages including English, French, German and Greek. The academic staff of the department aim at the fulfillment of current and future language needs of the TEI students and the development of the required skills by the students so that they can meet those needs and acquire a competitive advantage when they enter the arena of their professional life.

A recently initiated course in the department focuses on the Greek language and Greek history addresses the academic and linguistic needs of foreign students studying at TEI. It consists of 4 academic hours per week for the Greek Language, and 2 for the cultural seminars which include excursions in archaeological sites around Halkida.

The learning process of specialised English language in the T.E.I of Chalkida, Greece gives the students an opportunity to broaden their knowledge of English language skills in a variety of forms and genres and in response to numerous socio-cultural, economical and technological developments emerging as an outcome of globalisation and Information Age. English language courses in TEI involve the enactment of an ongoing learning process engendering the following fundamentals:

1. **A learner- and learning-centred approach** - a move from teaching to learning
2. **A communicative and task-based approach** with authentic communication tasks and learning tasks
3. Emphasis on **developing language skills and strategies**
4. Emphasis on **creativity**
5. **ESP in higher classes** - better preparation for work or study tasks
6. More intensive use of the **modern language** in the classroom developing **language awareness** and familiarity with multicultural perspectives in different academic disciplines
7. **Variety** in working methods
8. Use of **information technology, multimedia, E-mail** etc.
9. Encouraging **learner autonomy, self-assessment, cross-cultural awareness**
10. **Project work** (based on authentic, real-life situations, also lab exercises)

The specialised English language courses for the TEI students have been designed on the guidelines of the “**Common European Framework of Reference for Languages**” which was constituted in 2001 and amended in the follow up report entitled “**EU Action Plan 2004-2006 - Promoting Language Learning and Linguistic Diversity**” (See APPENDIX 1). According to this framework the main aims of the EU policy are:

- Ä Expansion of benefits through life-long foreign language learning to all citizens
- Ä Improvement of foreign language teaching methods and
- Ä Development of a friendlier environment for languages.
- Ä Building language-friendly communities

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5.2 Course Syllabus

Title	ELECTRICAL ENGINEERING – ENGLISH I		
Semester	2ND		
Department	Foreign Languages		
Category	S	Obligatory	
Type	Theoretical		
Hours/week	2 Lecture	Applied Exercises	Laboratory
Workload/Week	6		
ECTS points	3		
Prerequisites			
Objective:			
To familiarize the students with the electrical, electronic and computer engineering terminology in the foreign language of their choice and train their written and oral skills.			
Course Description:			
Specialised terminology on:			
- Measurements, electrical fields and circuits.			
- Magnetism, machines and electronics.			
Reading and listening comprehension of technical and scientific texts. Grammar exercises			
Suggested Readings:			
1. PEPPA, IF., 2008, "THE LANGUAGE OF TECHNICAL ENGLISH", ION PUBLICATIONS			
2. EASTWOOD, J., 2007, "OXFORD LEARNER GRAMMAR INTERMEDIATE, OXFORD.			

Title	ELECTRICAL ENGINEERING – ENGLISH II		
Semester	3RD		
Department	Foreign Languages		
Category	S	Obligatory	
Type	Theoretical		
Hours/week	2 Lecture	Applied Exercises	Laboratory
Workload/Week	6		
ECTS points	3		
Prerequisites	<p style="text-align: center;">ENGLISH I</p> <p>To enroll in this course, students need to have successfully completed 1 semester of studies in the English Language Level I in TEI; alternatively they should own a universally recognised certificate of English language competence (e.g. <i>Lower</i> or <i>Advanced</i> or <i>Proficiency</i> Certificate issued by Cambridge/Michigan University or or an equivalent certificate issued by the Greek Ministry of Education, YPEPTH).</p>		
Objective:			
<p>To familiarize the students with the electrical, electronic and computer engineering terminology in the foreign language of their choice and train their written and oral skills.</p>			
Course Description:			
<p>Specialised terminology on:</p> <ul style="list-style-type: none"> - Measurements, electrical fields and circuits. - Magnetism, machines and electronics. <p>Reading and listening comprehension of technical and scientific texts. Grammar exercises</p>			
Suggested Readings:			
<ol style="list-style-type: none"> 1. KIRIAZI-PAPAKONSTANTINOY, 2005, “ENGLISH FOR ELECTRICAL ENGINEERING AND ELECTRONICS - BOOK II”, ELLIN PUBLICATIONS 2. GLENDINNING, E. H. & MCEWAN, J., 2005, “BASIC ENGLISH FOR COMPUTING”, OXFORD, UK 			

Title	ELECTRICAL ENGINEERING – ENGLISH LANGUAGE TERMINOLOGY		
Semester	4 th		
Department	Department of Foreign Languages		
Category	Optional	Compulsory	
Type	Theoretical		
Hours/week	2 Lecture Hours		
Workload/Week	10		
ECTS points	4		
Prerequisites	ENGLISH I & II To enroll in this course, students need to have successfully completed 2 semesters of studies in the English Language Level I and Level II in TEI; alternatively they should own a universally recognised certificate of English language competence (e.g. <i>Lower</i> or <i>Advanced</i> or <i>Proficiency</i> Certificate issued by Cambridge/Michigan University or or an equivalent certificate issued by the Greek Ministry of Education, YPEPTH).		
Objective: This module is aimed for the students who are at the B2-C1 level of language competence on the CEF board and need to enhance their knowledge of the specialised foreign language used in their academic discipline to the extent that they will become able to literary or not, sophisticated and lengthy excerpts from specialized articles and lengthy technical guidelines related to their job specialty. Also on successful completion of this module learners should be able to understand the oral speech with no difficulty either in conditions of direct interaction or via mass communication media even when the fellow conversers talk fast, provided that there is adequate time for them to get familiar with a particular manner of speaking. Finally, they should also be able to identify the differences between different writing formats and produce written work of different formats (e.g. essays, articles, memos, reports, guidelines, etc).			

Course Description:

- The module includes reading comprehension and analysis of technical texts relevant to the area of Electrical Engineering at an advanced level of competence, ie: description of electronic components and devices, sources of electric energy, magnetism, cells and batteries, electromechanical devices, electronic communication systems, etc.
- The teaching methodology involves complex listening and writing activities, speaking tasks, acquisition of technical terminology as well as a thorough revision of all the foreign language grammatical and syntactical phenomena that have been taught in previous levels.

Teaching Methods

- Lecture
- Seminar
- Project work

Assessment Methods

Assessment takes place on a continuous basis and involves oral and written tests, presentations, assignments and project work. Most frequently used assessment methods are:

- End-of-term written exam paper
- In-term Assignment
- Poster presentation

Suggested Readings:

1. PAPACHARALAMBOUS, L. & PEPPA, IF., 2007, "ENGLISH FOR ENGINEERS", ELLIN PUBLICATIONS
2. KIRIAZI-PAPAKONSTANTINOY, 2005, "ENGLISH FOR ELECTRICAL ENGINEERING AND ELECTRONICS- BOOK IV", ELLIN PUBLICATIONS

APPENDIX 1

CEF (Common European Framework of Reference for Languages)

The Common European Framework divides learners into three broad divisions which can be divided into six levels:

A Basic User

A1 Breakthrough

A2 Waystage

B Independent User

B1 Threshold

B2 Vantage

C Proficient User

C1 Effective Operational Proficiency

C2 Mastery

The CEF describes what a learner is supposed to be able to do in reading, listening, speaking and writing at each level, in details:

level	Description
A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.
A2	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes & ambitions and briefly give reasons and explanations for opinions and plans.

B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
C1	Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself 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 organisational patterns, connectors and cohesive devices.
C2	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.

These descriptors can apply to any of the languages spoken in Europe, and there are translations in many languages.