Curriculum Guide

UNIVERSITY OF WESTERN MACEDONIA

DEPARTMENT OF MECHANICAL ENGINEERING

Academic Year 2013-2014

KOZANI 2013

http://www.mech.uowm.gr/

Table of Contents

1. CURRICULUM GUIDE

The Curriculum Guide contains the titles of the courses, their content, the sequence or interdependence of the courses. Note that besides the weekly lecture hours in the respective lecture halls, most mandatory courses include additional laboratory time or topics which are treated with an additional weekly lecture time.

The distribution of semester-long courses in semesters is indicative and not mandatory for students. It corresponds, however, to normal attendance schedule, adjusted to the minimum number of semesters required to receive the diploma and the sequence of the prerequisite and dependent prerequisite courses. The process of preparing the curriculum, establishes the prerequisites and their dependent courses from those prerequisites.

Whatever the chosen mix each student chooses, **it is highly recommended to follow at least the sequence of compulsory courses**, as given in the indicative curriculum. Otherwise, there is a risk of facing additional difficulties because of the lack of the necessary prerequisite knowledge for the attendance of certain courses. If a student fails a Mandatory course, Concentration Mandatory or Concentration Elective, the student must repeat it in the coming semester. Furthermore, it is recommended that students attend all lectures so as to have their questions, regarding the taught materials, answered during the Semester.

1.1. Secretariat

Secretary: Anna V. Tzika

Phone: 24610 56600, 24610 56602, 24610 56604, 24610 56605

FAX: 2461 056601 ή 24610 56603.

Address: University of Western Macedonia
Department of Mechanical Engineering
and Bakola Sialvera Str
GR 50 100 Kozani

1.2. Academic Advisors

First Study Cycle			
Semester	**Advisor**		
1^{o}, 2^{o}	A. Tompoulidis	Th. Theodoulidis	E. Konstantinidis
3^{o}, 4^{o}	A. Kontogianni	I. Bakouros	A. Tourlidakis
5^{o},6^{o}	G. Marnellos	N. Sapidis	G. Skodras
Second Study Cycle			
Semester	**Concentration**	**Advisor**	
7^{o}, 8^{o}	Energy	A.Tompoulidis	
	Industrial Management	I. Bakouros	
	Manufacturing	N. Sapidis	
Third Study Cycle			
Semester	**Concentration**	**Study Cycle Focus**	**Advisor**
9^{o}, 10^{o}	Energy	Energy production & transfer	A. Tompoulidis
	Energy	Environmental Engineering and Energy Use	E. Kikkinides
	Industrial Management	Industrial Management	I. Bakouros
	Manufacturing	Manufacturing & Materials	N. Sapidis

2. AIMS AND ORGANIZATION OF THE DEPARTMENT

The Department of Mechanical Engineering aims at fostering and promoting education, scientific research and knowledge on the key items of mechanical engineering.

Mechanical engineering covers a wide range of areas such as energy, environment, science and technology of materials, engine design and control systems engineering. The activities of mechanical engineering include, amongst others, research and development, design, testing and manufacture of products and systems, organization of production processes and business administration. Our Department is preparing young engineers so they can contribute to the continuous technological development and to distinguish themselves both nationally and internationally.

The aims of the Department regarding the education of students are:

- To provide students, at the end of their studies, with a deep knowledge of the principles relating to the subject of Mechanical Engineering.
- To educate them and give them the skills needed to apply this knowledge.
- To provide high quality knowledge, which reflects the needs of industry and nation in general
- To develop teaching methods and student assessment in the subjects taught
- To encourage students to give their best in their studies and ensure that they make the best use of the possibilities and opportunities available to them.
- To provide facilities and laboratories, which follow the progress and requirements of technology
- To strengthen scientific cooperation between students and enable them to study independently and to deepen their knowledge.

Thus, upon completion of five years of study the students will:

- Be able to apply their knowledge to contemporary problems of the industry over their core competence
- Be familiar with modern methods and techniques across the range of technologies over their core competence
- Be able to use modern tools to solve technical and scientific problems, such as use of computational tools and software applications.
- Be able to communicate effectively in writing and orally as well both as an individual and as a member of a team
- Be able to design, execute and manage a project.
- Have the ability to monitor individual development of their core competence and will be able to continually improve their knowledge thereof.
- Be able to provide direct services to industry and society.

The Department of Mechanical Engineering, over its educational function, is involved in developing and operating high-tech research laboratories, participating successfully in a number of national and international competitive research projects that have as an outcome publications in international journals and presentations at international or national conferences. Also, the Department places special emphasis on linking academic research to industrial production, research and development. The knowledge and skills provided to students of the Department, prepare them to staff with high ambitions the departments of production and development of industries and businesses. In addition, the Department hopes that some of its graduates will become reputable researchers who in turn become faculty members in Universities and research centers.

COURSE ORGANIZATION

CONCENTRATIONS

1. Energy Concentration

1st Cycle: Production, Transport and Distribution of Energy

2nd Cycle: Environmental Engineering and Energy Use

2. Industrial Management Concentration

1st Cycle Industrial Management

3. Manufacturing Concentration
1st Cycle Manufacturing & Materials

DEPARTMENT ORGANIZATION

Sections & Laboratories

1. Section: Production, Transport and Distribution of Energy
   Director: Prof. A. Tompoulidis
   - Laboratory of Thermodynamics and Thermal Engines
   - Laboratory of Fluid Mechanics and Rotatory Engines
   - Alternative Energy Laboratory

2. Section Environmental Engineering and Energy Use
   Director: Prof. I. Bartzis
   - Laboratory of Energy Use Technologies
   - Environmental Technology Laboratory

3. Section Industrial Management
   Director: Assis. Prof. I. Bakouros
   - Laboratory of Management of Energy Systems and Energy Policy
   - Laboratory of Economics & Administration of Production Units

4. Section Manufacturing & Materials
   Director: Prof. N. Sapidis
   - Laboratory of Mechanical Engineering Systems
   - Laboratory of Materials

3. INFORMATION ON THE ORGANIZATION OF STUDIES

3.1. Duration of Study

The **minimum period** of study is **10 semesters**. Each semester includes at least 13 full weeks of classes. The **maximum duration of study** (application of provisions in Article 14, paragraph 1, of Law 3459/2007) is as follows:

a) From the academic year 2007-2008, the maximum duration of undergraduate studies may not exceed the minimum number of semesters required to obtain a degree, according to an indicative curriculum of the department, increased by 100%. In exceptional cases it is possible by the Senate, after fully substantiated recommendation of the General Assembly of the Faculty and student request, extending the maximum duration of the applicant, up to two (2) semesters.

B) Students have the right, by written request to the Secretariat of the Department, to suspend their studies a requested number of consecutive or not semesters and not more than the minimum number of semesters required for a degree according to an indicative curriculum. Those semesters are not counted in the above maximum duration. Students, who suspend their studies, do not have student status throughout the period of interruption of their studies. After the end of the interruption of studies, students regain their normal student status at the Department.

C) After the maximum attendance, a student automatically loses their student status. The loss of student status is declared by the Secretary of the Department confirming the courses in which the student has been examined successfully.

D) Students who, during the academic year 2007-2008 were enrolled in the Department and had not yet reached the minimum number of semesters required to obtain a degree, according to an indicative program of the Department may continue their studies until the completion of this minimum number of semesters and beyond five (5) additional academic years . Students who in the academic year 2007-2008, had already reached the minimum number of semesters required to obtain a degree, according to an indicative program of the Department may continue their studies for five academic years, beginning from the academic year 2007-2008.

e) Students who, during the academic year 2007-2008, had already exceeded this maximum attendance are invited in writing by the Department to declare in writing whether they wish to continue their studies. In case of a solemn affirmation they can continue their studies for five (5) more academic years, beginning from the academic year 2007-2008 otherwise are removed from the records of the Department and lose of student status. The loss of student status is issued on declaratory act by the Secretary of the Department, confirming the courses in which the student has been examined successfully.

3.2. Study Cycles & Concentrations – Focused Study Cycles

Studies in Mechanical Engineering at the University of Western Macedonia, including three Study Cycles.

First Study Cycle lasts six semesters (1st to 6th) and includes 38 required courses (including engineering work), which are common to all concentrations of study.

Second Study Cycle lasts two semesters (7th and 8th). It includes twelve (12) courses (six joint Required Concentration courses for all concentrations, two Elective Concentration courses for each Concentration and four Elective courses for each Concentration). In the second cycle students are given the opportunity, based on their interests, to choose one of the following Fields of Study.

1. Energy Concentration
2. Concentration Industrial Management
3. Manufacturing Concentration

The Concentration which each student wishes to follow is determined by corresponding **Statement for inclusion in Concentration Studies**, submitted by the student to the Secretariat at the beginning of the **Second Study Cycle** (7th Semester).

Third Study Cycle (9th and 10th semester) includes eight (8) courses Elective (Mandatory Cycle), organized in cycles for each Focused Study Cycles and available Concentration.

Focused Study Cycles per concentration:

1. Energy Concentration

1st Focused Study Cycle: Production, Transport and Distribution of Energy

2st Focused Study Cycle: Environmental Engineering and Energy Use

2. Industrial Management Concentration
1st Focused Study Cycle: Industrial Management

3. Manufacturing Concentration
1st Focused Study Cycle: Manufacturing & Materials

The **Focused Study Cycle** which each student wishes to follow is determined by the corresponding **statement for inclusion in the Focused Study Cycle** (included in the Concentration chosen during the second Study Cycle), submitted by the student to the Secretariat at the beginning of the **Third Study Cycle** (9 ° semester).

Summary table of the required courses for successful degree completion that leads to the award of Diploma in Mechanical Engineering

Enrollment year	Number of Courses in 1st Study Cycle (1-2 -3rd year)	Number of Coursesin2nd Study Cycle (4th year)	Number of Coursesin3rd Study Cycle (5th year)	Total, inc. Design Project	Overview
1999-2001	31 MANDATORY (M)	6 CONCENTRATION MANDATORY (CM) 4 ELECTIVE (E) +Mechanical Design Project	8 CYCLE MANDATORY(CM) + DIPLOMA THESIS	50+ DIPLOMA THESIS	**31 M, 14 CM** **4 E** **DP**
2002-2004	32 MANDATORY (M) + Mechanical Design Project	6 CONCENTRATION MANDATORY (CM) 4 ELECTIVE (E)	8 CYCLE MANDATORY(CM) + DIPLOMA THESIS	51 + DIPLOMA THESIS	**32 M, 14 CM** **4 E** **DP**
2005-2009	37 MANDATORY (M) + Mechanical Design Project	6 CONCENTRATION MANDATORY (CM) 4 CONCENTRATION ELECTIVE (CE) 2 ELECTIVE(E)	8 CYCLE MANDATORY (CM) + DIPLOMA THESIS	58 + DIPLOMA THESIS	**37 M, 14 CM** **4 CE, 2 E** **DP**
2010-2012	37 MANDATORY (M) + Mechanical Design Project	6 CONCENTRATION MANDATORY (CM) 2 CONCENTRATION ELECTIVE (CE) 4 ELECTIVE (E)	3 CYCLE MANDATORY(CM) 5 CYCLE ELECTIVE (EK) + DIPLOMA THESIS	58 + DIPLOMA THESIS	**37 M, 9 CM** **2 CE, 9 E** **DP**
2012-2013	34 MANDATORY (M) + Mechanical Design Project	6 CONCENTRATION MANDATORY (CM) 4 CONCENTRATION ELECTIVE (CE) 2 ELECTIVE (E)	3 CYCLE MANDATORY(CM) 5 CYCLE ELECTIVE (EK) + DIPLOMA THESIS	55+ DIPLOMA THESIS	**34 M, 9 CM** **2 CE, 9 E** **DP**
Note:DP = Design Project					

3.3. Documentation for new students

Based on the results of the General Examinations the Ministry of Education determines the deadline for registration of successful candidates.

For the registration, the successful candidates, or legally authorized person, should submit the following documents to the Secretariat:

1. **Application** for registration (form provided by the Secretariat).
2. **High School graduation diploma**, or baccalaureate degree or evidence of the school from which the student graduated or legally certified copy or photocopy of such.
3. **Solemn declaration**, which states that the candidate-student has not applied for enrollment in another School or Department of Higher Education of Greece (provided by the Secretariat).
4. Four (4) personal identification (ID) **photos**.
5. At registration, the candidate-student demonstrates to the Secretariat the **ID card** or other publicly issued proof of ID document and submits a single copy.
6. A copy of the **Access Certificate** (provided by the Secretariat).

3.4. Semester Course Registration

At **the beginning of each semester** and at specified dates, each student must submit to the Secretariat a Course Registration statement (form provided). **After the deadline, no course registration will be accepted nor any modifications to the registration submitted are allowed.**

With this statement, each student acquires the right to:

1. **receive the teaching aids** through the online Evdoxos site (books, notes, etc.) available for these courses at the beginning of this semester.
2. **participate in examinations** of registered current semester courses and participate in the examination period of following

September.

The above statement may be made **personally** by the student or anyone who will have **legal authority** for this purpose, or by registered letter.

If students fail to file a statement at the beginning of the semester, then they will be considered as not currently attending lectures, and thus will not be entitled to have copies of printed study material (books - notes) and will be barred from taking part in examinations for this semester. The 1st year students may declare to attend only the courses that correspond to the first semester.

Past year students are entitled to register up to eight (8) courses in the following priority: first register the failed-to-pass courses starting from the earlier semester. The **number of new courses may add to the number of eight courses, but under no circumstances exceed the maximum number of six (6).** The Mechanical Engineering Capstone project elective does not add to the above limit of eight courses and can be registered in addition.

For the Fall Semester only those courses included in courses in Fall Semester of the indicative Study Curriculum can be registered (1st, 3rd, 5th, 7th and 9th). For Spring Semester only courses of the Spring Semester of the indicative Study Curriculum can be registered (2nd, 4th, 6th, 8th and 10th). **Courses of the Fall Semester are not taught in Spring Semester and vice versa.**

3.5. Student Assessment - Examinations

The assessment of student performance in each subject is made throughout the course of the academic year. The final grade in each course consists of two parts. The first part, which accounts for 30% of the final grade, which evaluates the performance of the student during the semester resulting from homework or at least an interim written examination at the discretion of the instructor. The second part, accounts for 70% of the final grade and reflects the performance in the final examination.

For the final examinations of courses taught in each semester, there are **2 examination** periods. The first takes place immediately after the end of the respective semester, Fall or Spring. The second takes place in September, before the beginning of the next semester.

Each student is eligible to **participate in the examination only for the registered courses of the semester**, **as per the statement, submitted at the beginning of the respective semester.**

The exams period lasts three weeks for January-February, three weeks in June and four weeks in September period, but can be lengthened if necessary.

If a student does not participate in exams or participates but still does not obtain a final grade that is greater than or equal to five after the second and final exam in September, then:

1. If the course is **Mandatory or Concentration Mandatory or Concentration Elective, then has** an **obligation to register again for the coming s**emester. With this statement they are given the opportunity to repeat the educational process in this course and regain the right to participate in their respective examinations.

2. If it is an **Elective course**, **re-registration is possible for the coming semester** to repeat the educational process in this course and thus, obtain the right to participate in their respective examinations. It is also possible for Electives to be dropped from selection and substituted by other available electives for the chosen Concentration.

3.6. Teaching Aids

The teaching is supplemented by the relevant textbooks and other teaching aids that are provided free to students, including information and access to the relevant Greek and foreign literature sources (Law Art. 23 § 2 N 1268/82).

3.7. Changing Study Concentration

If a student once registered to follow a specific Concentration, wishes for some reason to change Concentration, they may do so within the deadline of the pertinent registration statements for choosing a concentration at the beginning of the next six months, stating the Concentration of the new preference.

Changing Concentration is done along with the Course Registration for the Spring Semester of fourth year and provided the student successfully complete the exams in the new chosen Concentration courses (common core, Elective Concentration and Elective), regardless the number of successful examinations achieved by the time of change.

3.8. Mechanical Engineering Capstone Project– Diploma Thesis

The courses in Mechanical Engineering, in addition to courses taught, include two self-study projects.

α) Engineering Design Project

The Engineering Design Project (Student Self-Study) is a mandatory subject of detailed analysis and study in the design or manufacture of any device or process, based on knowledge acquired and aims to demonstrate the possibility of synthesis of knowledge acquired as well as the ability to address practical problems. Depending on how it is carried out, it may help students to develop collaboration skills with other technicians which are necessary in today's society.

This project is carried out at the end of the First Cycle Studies, can be performed in collaboration with other students under the guidance of supervisor and is not graded but assessed as pass / fail counting for a mandatory six-month course.

β) Diploma Thesis

Studies in Mechanical Engineering are completed with the Diploma Thesis. This extended written project is an extensive study in a scientific area of the Department. The thesis is meant to demonstrate that the student is able to work and to pursue science in a specific subject.

Each student can choose the area of the thesis. **The only limitation to this option is that the thesis should correspond to one discipline (at least) from the courses included in Concentration of Studies, which the student has attended.**

3.9. Degree

All graduates of the Department of Mechanical Engineering UoWM are awarded, without discrimination, the degree of Diploma in Mechanical Engineering.

In the transcript, which every graduate can obtain, all the courses that were attended are listed in detail. From this certificate, which reflects the individual course choices of the graduate, it is evident which Concentration Studies and Focused Study Cycle were followed.

3.10. Degree Grade Calculation

The degree is calculated using the following algorithm:

α) all 37 first cycle courses (excluding the Engineering Design Project), the 12 second cycle courses (Concentration Mandatory, Concentration Elective and Elective) along with the eight third cycles courses (Cycle Mandatory) as per the indicative Curriculum Guide are required for obtaining a Degree and carry a weight of W_i=1.

β) Diploma thesis weight is W_δ=6.

Degree grade is then (D.G.) given by:

$$\mathrm{D.G.} = \frac{W_\delta B_\delta + \sum_{i=1}^{M} W_i B_i}{W_\delta + \sum_{i=1}^{M} W_i}$$

where M is the number of courses passed successfully in exams, B_i is the successful examination grade of course i and B_δ is the Diploma Thesis grade.

4. SECRETARIAT RESPONSIBILITIES AND SCHEDULE

Secretariat is responsible for student and administrative issues. Specifically student issues include:

1. Student registration.

2. Maintaining a student record including the grades, information on grants and awarded degrees.

3. Drafting records of students, according to the declaration of their Elective courses that they wish to attend.

4. Issuing certificates.

As regards the services to students, opening schedule includes all working days from **11:00 to 13:00** at the offices of the Secretariat.

For **enrollments of new students** in particular:

Upon official receipt from the Ministry of the enrollment list of candidates, the Executive Committee of UoWM specifies the period within which new students can register. **Compliance with this deadline is mandatory**, which means that a candidate loses their registration ticket if application is not submitted within the specified dates. Immediately after issuing the registration period, this is reported to the notice board of the Department.

The Secretariat finally informs students about the European student exchange programs, as well as the **regulation of written examinations**.

5. Semester Program

ECTS Credits: Course Credits according to European Credit Transfer System (E.C.T.S.)

1st Study Cycle

The First Study Cycle includes six Semesters (1st to 6th). All courses are mandatory.

1st Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	101	Mathematical Analysis I	*Th. Zigiridis*		Mandatory	4	5
2	103	Physics I	*E. Souliotis*		Mandatory	4	5
3	104	Chemistry	*G. Marnellos*	*E.Tolis*	Mandatory	4	5
4	105	Introduction to Computing	*I. Bartzis, M. Politis*		Mandatory	5	5
5	113	Mechanical Drawing I	N. Sapidis		Mandatory	4	5.5
6	144	Linear Algebra	*Mpalassas*		Mandatory	3	3.5
7	141	English I	*A. Vamvakos*		Mandatory	2	2

2nd Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	102	Mathematical Analysis II	*Th. Zigiridis*		Mandatory	4	5
2	109	Science and Technology of Materials I			Mandatory	5	6
3	111	Engineering Statics	*N. Sapidis*		Mandatory	5	6
4	146	Mechanical Drawing II	N. Sapidis		Mandatory	4	6
5	149	Technology and Innovation, Introduction to Economics	*i. Bakouros*		Mandatory	3	4
6	142	English II	*A. Vamvakos*		Mandatory	2	2

3rd Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	110	Strength of Materials	I. Mirisidis		Mandatory	5	6.5
2	107	Statistics	G. Nenes	S. Panagiotidou	Mandatory	5	6
3	119	Thermodynamics	A. Tompoulidis		Mandatory	5	6.5
4	132	Mathematical Analysis III	*Th. Zigiridis*		Mandatory	4	5
5	135	Science and Technology of Materials II	F. Stergioudi		Mandatory	5	6

4th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	112	Dynamics	D. *Giagopoulos*		Mandatory	5	6.5
2	108	Machine Elements I(and Mechanical Engineering Laboratory)	*I. Mirisidis*		Mandatory	5	6.5
3	120	Fluid Mechanics I	E. Kikkinides		Mandatory	5	6
4	137	Mathematical Analysis IV	Th. Zigiridis		Mandatory	4	5
5	114	Fundamentals of Machining	I. Mirisidis		Mandatory	5	6

5th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	118	Heat Transfer	*E. Konstantinidis , I. Bartzis*		Mandatory	5	5.5
2	140	Mechanical Vibration and Machine Dynamics	D. Giagopoulos		Mandatory	5	5.5
3	147	Operations Research	*G. Nenes*		Mandatory	5	5.5
4	116	Electrotechnics	B. Tsachouridis		Mandatory	5	5
5	138	Machine Elements II	*I. Mirisidis*		Mandatory	5	5.5
6	199	Mechanical Engineering Capstone Project	*A. Kontogianni*		Mandatory	4	4

6th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	117	Electric Machines	I. Bartzis	K. Rallis	Mandatory	5	5
2	127	Alternative Energy Systems	G. Skodras		Mandatory	4	4.5
3	123	Industrial Management	*I. Bakouros*	*S.Panagiotidou*	Mandatory	5	5.5
4	106	Numarical Analysis & Simulation	I. Bartzis		Mandatory	5	5
5	131	Environmental Technology	G. Marnellos		Mandatory	4	4.5
6	133	Thermodynamics II	A. Tompoulidis		Mandatory	5	5.5

2nd Study Cycle

The 2nd Study Cycle includes two semesters (7o and 8o).

α) Concentration: Energy

7th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	204	Steam Generators I	A. Tompoulidis		Concentration Mandatory	5	5.5
2	207	Heating, Ventilation and Air-Conditioning	X. Koroneos		Concentration Mandatory	5	5.5
3	219	Automatic Control Systems	N. Fachantidis		Concentration Mandatory	5	5.5
4	372	Numerical methods in design of mechanical structures	*D. Giagopoulos*		Elective	5	4.5
5	206	ICE	A Tompoulidis	D. Kolokotronis	Elective Concentration	5	4.5
6	228	Computational Engineering I	E. Kikkinides	M. Politis	Elective	4	4.5
7	250	Measurement Methods and Experimental Techniques	*E. Konstantinidis*		Elective	4	4.5
8	230	Quality Control	G. Nenes	S. Panagiotidou	Elective	4	4.5

8th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	205	Turbomachinery	A. Tourlidakis		Concentration Mandatory	5	5.5
2	241	Systems Reliability, Maintenance and Safety	I.Bakouros		Concentration Mandatory	5	5.5
3	249	Fluid Mechanics II	*E. Konstantinidis*		Concentration Mandatory	4	5.5
4	224	Strategic Management	I. Bakouros		Elective	4	4.5
5	252	Computer Aided Manufacturing for Industrial Production			Elective	4	4.5
6	251	Energy design of buildings I	E. Souliotis		Elective Concentration	4	4.5
7	246	Inventory and Supply Chain Management	*G. Nenes*		Elective	4	4.5
8	240	Electromechanical Applications	I. Bartzis	K. Rallis	Elective	4	4.5
9	253	Multivariate Statistics	*G. Nenes*	S. Panagiotidou	Elective	4	4.5
10	210	Unit Operations	E.Kikkinides	M. Politis	Elective	4	4.5

Choose 3 common Concentration Mandatory courses and 1 Concentration Elective.

You have to choose 2 more Elective Courses from those available.

β) Concentration: Industrial Management

7th Semester

A/A	**Code**	**Course**	**Instructor**	**Assisting**	**Course Designation**	**Hours**	**ECTS Credits**
1	204	Steam Generators I	A. Tompoulidis		Concentration Mandatory	5	5.5
2	207	Heating, Ventilation and Air-Conditioning	X. Koroneos		Concentration Mandatory	5	5.5
3	219	Automatic Control Systems	N. Fachantidis		Concentration Mandatory	5	5.5
4	372	Numerical methods in design of mechanical structures	*D. Giagopoulos*		Elective	5	4.5
5	206	ICE	A Tompoulidis	D. Kolokotronis	Elective	5	4.5
6	228	Computational Engineering I	E. Kikkinides	M. Politis	Elective	4	4.5
7	250	Measurement Methods and Experimental Techniques	*E. Konstantinidis*		Elective	4	4.5
8	230	Quality Control	G. Nenes	S. Panagiotidou	Elective Concentration	4	4.5

8th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	205	Turbomachinery	A. Tourlidakis		Concentration Mandatory	5	5.5
2	241	Systems Reliability, Maintenance and Safety	I.Bakouros		Concentration Mandatory	5	5.5
3	249	Fluid Mechanics II	*E. Konstantinidis*		Concentration Mandatory	4	5.5
4	224	Strategic Management	I.Bakouros		Elective	4	4.5
5	252	Computer Aided Manufacturing for Industrial Production			Elective	4	4.5
6	251	Energy design of buildings I	E. Souliotis		Elective	4	4.5
7	246	Inventory and Supply Chain Management	*G. Nenes*		Elective	4	4.5
8	240	Electromechanical Applications	I. Bartzis	K. Rallis	Elective	4	4.5
9	253	Multivariate Statistics	*G. Nenes*	S. Panagiotidou	Elective Concentration	4	4.5
10	210	Unit Operations	E.Kikkinides	M. Politis	Elective	4	4.5

Choose 3 common Concentration Mandatory courses and 1 Concentration Elective.

You have to choose 2 more Elective Courses from those available.

γ) Concentration: Manufacturing

7th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	204	Steam Generators I	A. Tompoulidis		Concentration Mandatory	5	5.5
2	207	Heating, Ventilation and Air-Conditioning	X. Koroneos		Concentration Mandatory	5	5.5
3	219	Automatic Control Systems	N. Fachantidis		Concentration Mandatory	5	5.5
4	372	Numerical methods in design of mechanical structures	*D. Giagopoulos*		Elective Concentration	5	4.5
5	206	ICE	A Tompoulidis	D. Kolokotronis	Elective	5	4.5
6	228	Computational Engineering I	E. Kikkinides	M. Politis	Elective	4	4.5
7	250	Measurement Methods and Experimental Techniques	*E. Konstantinidis*		Elective	4	4.5
8	230	Quality Control	G. Nenes	S. Panagiotidou	Elective	4	4.5

8th Semester

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	205	Turbomachinery	A. Tourlidakis		Concentration Mandatory	5	5.5
2	241	Systems Reliability, Maintenance and Safety	I.Bakouros		Concentration Mandatory	5	5.5
3	249	Fluid Mechanics II	*E. Konstantinidis*		Concentration Mandatory	4	5.5
4	224	Strategic Management	I. Bakouros		Elective	4	4.5
5	252	Computer Aided Manufacturing for Industrial Production			Elective	4	4.5
6	251	Energy design of buildings I			Elective	4	4.5
7	246	Inventory and Supply Chain Management	*G. Nenes*		Elective	4	4.5
8	240	Electromechanical Applications	I. Bartzis	K. Rallis	Elective Concentration	4	4.5
9	253	Multivariate Statistics	*G. Nenes*	S. Panagiotidou	Elective	4	4.5
10	210	Unit Operations	E.Kikkinides	M. Politis	Elective	4	4.5

Choose 3 common Concentration Mandatory courses and 1 Concentration Elective.

You have to choose 2 more Elective Courses from those available.

8.3 Third Study Cycle

The 3rd Study Cycle includes two semesters (9o and 10o).

Courses per Concentration and Study cycle follow:

α) Concentration: Energy

9th Semester

Cycle: Production, Transport and Distribution of Energy

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	316	Solar energy technology/Photovoltaic systems	E. Souliotis		Mandatory	4	4
2	386	Emissions and transport of Air pollutants	*I. Bartzis*	*E. Tolis*	Elective	4	4
3	318	Wind and water turbines, hydroelectric plants	A. Tourlidakis		Mandatory	4	4
4	350	Special topics on pollution control	G. Marnellos		Elective	4	4

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
		technologies					
5	380	Computer Aided Design	N. Sapidis		Elective	4	4
6	371	Vehicle Design Methods	Not Available		Elective	4	4
7	356	Technology, Research, Innovation Policies and Entrepreneurship	I. Bakouros		Elective	5	4
8	352	Techno-economic assessment	G. Skodras		Elective	5	4
9	389	Risk Management and Safety of Large Industrial Systems	Not Available		Elective	4	4
10	377	Operations Research II	Not Available		Elective	4	4
11	376	Technical and Energy Legislature	G. Skodras		Elective	3	4
12	226	Gas Turbine Technology	Not Available		Elective	4	4
13	387	Environmental Management	A. Kontogianni		Elective	4	4

10th Semester

Cycle: Production, Transport and Distribution of Energy

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	309	Pumps, compressors and mass transport	E. Konstantinidis		Elective	4	4
2	348	Combustion Phenomena	D. Kolokotronis		Elective	4	4
3	381	Computational Engineering II	Not Available		Elective	4	4
4	382	Rotordynamics	D. Giagopoulos		Elective	4	4
5	379	Applications of Materials for Energy and Environmental Technologies	E. Souliotis		Elective	4	4
6	349	Special topics on power generation	G. Marnellos		Mandatory	4	4
7	367	Simulation and System Dynamics	G. Nenes		Elective	4	4
8	327	Energy design of buildings II	Not Available		Elective	4	4
9	388	Economic Valuation of Energy and Industrial Externalities	Not Available		Elective	4	4
10	383	Energy saving technologies and Industrial Systems Optimization	G. Skodras		Elective	4	4

Choose 3 common Concentration Mandatory courses .

You have to choose 5 more Elective Courses from those available.

9th Semester

Cycle: Environmental Engineering and Energy Use

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	316	Solar energy technology/Photovoltaic systems	E. Souliotis		Elective	4	4
2	386	Emissions and transport of Air pollutants	*I. Bartzis*	*E. Tolis*	Mandatory	4	4
3	318	Wind and water turbines, hydroelectric plants	A. Tourlidakis		Elective	4	4
4	350	Special topics on pollution control technologies	G. Marnellos		Mandatory	4	4
5	380	Computer Aided Design	N. Sapidis		Elective	4	4
6	371	Vehicle Design Methods	Not Available		Elective	4	4
7	356	Technology, Research, Innovation Policies and Entrepreneurship	I. Bakouros		Elective	5	4
8	352	Techno-economic assessment	G. Skodras		Elective	5	4
9	389	Risk Management and Safety of Large Industrial Systems	Not Available		Elective	4	4
10	377	Operations Research II	Not Available		Elective	4	4
11	376	Technical and Energy Legislature	G. Skodras		Elective	3	4
12	226	Gas Turbine Technology	Not Available		Elective	4	4
13	387	Environmental Management	A. Kontogianni		Elective	4	4

10th Semester

Cycle: Environmental Engineering and Energy Use

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	309	Pumps, compressors and mass transport	E. Konstantinidis		Elective	4	4
2	348	Combustion Phenomena	*D. Kolokotronis*		Elective	4	4
3	381	Computational Engineering II	Not Available		Elective	4	4
4	382	Rotordynamics	D. Giagopoulos		Elective	4	4
5	379	Applications of Materials for Energy and Environmental Technologies	E. Souliotis		Elective	4	4
6	349	Special topics on	G. Marnellos		Mandatory	4	4

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
		power generation					
7	367	Simulation and System Dynamics	G. Nenes		Elective	4	4
8	327	Energy design of buildings II	Not Available		Elective	4	4
9	388	Economic Valuation of Energy and Industrial Externalities	Not Available		Elective	4	4
10	383	Energy saving technologies and Industrial Systems Optimization	G. Skodras		Elective	4	4

Choose 3 common Concentration Mandatory courses .

You have to choose 5 more Elective Courses from those available.

9th Semester

B) Concentration Industrial Management

Cycle: Industrial Management

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	316	Solar energy technology/Photovoltaic systems	E. Souliotis		Elective	4	4
2	386	Emissions and transport of Air pollutants	*I. Bartzis*	*E. Tolis*	Elective	4	4
3	318	Wind and water turbines, hydroelectric plants	A. Tourlidakis		Elective	4	4
4	350	Special Issues to Control Pollution Technologies	G. Marnellos		Elective	4	4
5	380	Computer Aided Design	N. Sapidis		Elective	4	4
6	371	Vehicle Design Methods	Not Available		Elective	4	4
7	356	Technology, Research, Innovation Policies and Entrepreneurship	I. Bakouros		Mandatory	5	4
8	352	Techno-economic assessment	G. Skodras		Mandatory	5	4
9	389	Risk Management and Safety of Large Industrial Systems	Not Available		Elective	4	4
10	377	Operations Research II	Not Available		Mandatory	4	4

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
11	376	Technical and Energy Legislature	G. Skodras		Elective	3	4
12	226	Gas Turbine Technology	Not Available		Elective	4	4
13	387	Environmental Management	A. Kontogianni		Elective	4	4

10th Semester

Cycle: Industrial Management

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	309	Pumps, compressors and mass transport	E. Konstantinidis		Elective	4	4
2	348	Combustion Phenomena	*D. Kolokotronis*		Elective	4	4
3	381	Computational Engineering II	Not Available		Elective	4	4
4	382	Rotordynamics	D. Giagopoulos		Elective	4	4
5	379	Applications of Materials for Energy and Environmental Technologies	E. Souliotis		Elective	4	4
6	349	Special topics on power generation	G. Marnellos		Elective	4	4
7	367	Simulation and System Dynamics	G. Nenes		Elective	4	4
8	327	Energy design of buildings II	Not Available		Elective	4	4
9	388	Economic Valuation of Energy and Industrial Externalities	Not Available		Elective	4	4
10	383	Energy saving technologies and Industrial Systems Optimization	G. Skodras		Elective	4	4
11	309	Pumps, compressors and mass transport	E. Konstantinidis		Elective	4	4

Choose 3 common Concentration Mandatory courses.

You have to choose 5 more Elective Courses from those available.

9th Semester

C) Manufacturing Concentration

Cycle: Manufacturing & Materials

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	316	Solar energy technology/Photovoltaic systems	E. Souliotis		Elective	4	4
2	386	Emissions and transport of Air pollutants	*I. Bartzis*	*E. Tolis*	Elective	4	4
3	318	Wind and water turbines, hydroelectric plants	A. Tourlidakis		Mandatory	4	4
4	350	Special topics on pollution control technologies	G. Marnellos		Elective	4	4
5	380	Computer Aided Design	N. Sapidis		Mandatory	4	4
6	371	Vehicle Design Methods	Not Available		Elective	4	4
7	356	Technology, Research, Innovation Policies and Entrepreneurship	I. Bakouros		Elective	5	4
8	352	Techno-economic assessment	G. Skodras		Elective	5	4
9	389	Risk Management and Safety of Large Industrial Systems	Not Available		Elective	4	4
10	377	Operations Research II	Not Available		Elective	4	4
11	376	Technical and Energy Legislature	G. Skodras		Elective	3	4
12	226	Gas Turbine Technology	Not Available		Elective	4	4
13	387	Environmental Management	A. Kontogianni		Elective	4	4

10th Semester

Cycle: Manufacturing & Materials

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
1	309	Pumps, compressors and mass transport	E. Konstantinidis		Elective	4	4
2	348	Combustion Phenomena	*D. Kolokotronis*		Elective	4	4
3	381	Computational Engineering II	Not Available		Elective	4	4
4	382	Rotordynamics	D. Giagopoulos		Mandatory	4	4
5	379	Applications of Materials for Energy and Environmental Technologies	E. Souliotis		Elective	4	4
6	349	Special topics on power generation	G. Marnellos		Elective	4	4
7	367	Simulation and System Dynamics	G. Nenes		Elective	4	4
8	327	Energy design of buildings II	Not Available		Elective	4	4

A/A	Code	Course	Instructor	Assisting	Course Designation	Hours	ECTS Credits
9	388	Economic Valuation of Energy and Industrial Externalities	Not Available		Elective	4	4
10	383	Energy saving technologies and Industrial Systems Optimization	G. Skodras		Elective	4	4

Choose 3 common Concentration Mandatory courses.

You have to choose 5 more Elective Courses from those available.

6. Course Contents

*Detailed Course description of **available** courses*

Abbreviations:

Sm.: Course Semester

C.H.: Weekly Course Lecture hours

ECTS: Course Credits according to European Credit Transfer System (E.C.T.S.)

Semester duration is 13 full weeks

Lecture language is Greek

101 Mathematical Analysis I	Sm.	C.H.	ECTS
	1	4	5

Course title Mathematical Analysis I

Course code 101

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1st

Semester 1st

ECTS Credits 5

URL eclass.uowm.gr/courses/ICTE108/

Hours per week 4

Instructor(s) Theodoros Zygiridis (Assistant Professor)

Course content Sets. Real numbers. Sequences of real numbers. Series of real numbers. Real functions of a single variable. Limits and continuity. Derivatives. Application of derivatives. Indefinite and definite integrals, improper integrals. Applications of integration. Power series.

Expected

learning outcomes and competences to be acquired: Upon successful completion of this course, students will be able:

- *to examine the convergence of real sequences, series, as well as power series,*
- *to calculate infinite sums,*
- *to study real functions of one variable,*
- *to differentiate parametrically-defined and implicit functions,*
- *to determine lines tangent to plane curves that are described in different ways,*
- *to calculate indefinite, definite, and improper integrals,*
- *to use polar coordinates,*
- *to calculate the area between curves, and the length of plane curves,*
- *to approximate functions with polynomials.*

Prerequisites None

Teaching methods Lectures, exercises

Assessment methods Written final exam (100%)

Language of instruction Greek

Recommended bibliography [1] R. L. Finney, M. D. Weir, F. R. Giordano, Απειροστικός Λογισμός, Πανεπιστημιακές Εκδόσεις Κρήτης, 2012.

[2] F. Ayres, Διαφορικός και Ολοκληρωτικός Λογισμός, Κλειδάριθμος, 2008.

[3] Θ. Ρασσιάς, Μαθηματική ανάλυση I, ΣΥΜΕΩΝ, 2011.

[4] Brand, Louis Μαθηματική ανάλυση, Εκδόσεις I. Συμεών , 1984

[5] Ghorpade, Sudhir R.Limaye, Balmohan V., A Course in Calculus and Real Analysis [electronic resource], Heal-Link / Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

[6] H. Anton, I. Bivens, S. Davis, Calculus – Early Transcendentals (9th ed), John Wiley & Sons, 2009.

102 Mathematical Analysis II	Sm.	C.H.	ECTS
	2	4	5

Course title *Mathematical Analysis II*

Course code *102*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *1st*

Semester *2nd*

ECTS Credits *5*

URL *eclass.uowm.gr/courses/ICTE136/*

Hours per week *4*

Instructor(s) *Theodoros Zygiridis (Assistant Professor)*

Course content *The ℝn space. Quadratic surfaces. Real functions of several variables. Partial derivatives. Chain differentiation. Directional derivative. Extreme values. Taylor series. Double integrals. Triple integrals. Vector functions. Curves. Line integrals. Differentiation of scalar and vector fields. Conservative fields. Green's theorem. Surface integrals. Gauss και Stokes theorems.*

Expected learning outcomes and competences to be acquired: *Upon successful completion of this course, students will be able:*

- *to differentiate variables of several functions,*
- *to use cylindrical and spherical coordinates,*
- *to find extreme values (free/constraint) and saddle points,*
- *to linearize functions and find tangent planes,*
- *to perform double and triple integration,*
- *to manipulate vectors,*
- *to differentiate vector functions,*
- *to detect irrotational and solenoidal fields,*
- *to determine potentials for conservative fields,*
- *to parametrically describe curves and surfaces,*
- *to calculate line integrals and fluxes through surfaces of vector fields,*
- *to use Green's, Gauss, και Stokes theorems.*

Prerequisites *Elements of the following course are required:*

- *Mathematical Analysis I*

Teaching methods *Lectures, exercises*

Assessment methods *Written final exam (100%)*

Language of instruction *Greek*

Recommended bibliography
[1] R. L. Finney, M. D. Weir, F. R. Giordano, Απειροστικός Λογισμός, Πανεπιστημιακές Εκδόσεις Κρήτης, 2012.

[2] F. Ayres, Διαφορικός και Ολοκληρωτικός Λογισμός, Κλειδάριθμος, 2008.

[3] Θ. Ρασσιάς, Μαθηματική ανάλυση Ι, ΣΥΜΕΩΝ, 2011.

[4] Brand, Louis Μαθηματική ανάλυση, Εκδόσεις Ι. Συμεών , 1984

[5] Ghorpade, Sudhir R.Limaye, Balmohan V., A Course in Calculus and Real Analysis [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

[6] H. Anton, I. Bivens, S. Davis, Calculus – Early Transcendentals (9th ed), John Wiley & Sons, 2009.

103 Physics I	Sm.	C.H.	ECTS
	1	4	5

Course title Physics

Course code 103

Course type Compulsory Course

Course level Undergraduate

Year of studies 1

Semester 1

ECTS Credits 5

URL http://eclass.uowm.gr/courses/MECH201/

Hours per week 4

Instructor(s) Manolis Souliotis

Course content Basic Theory of Mechanics. Newton's Laws. Forces. Principles of Energy Conservation of Momentum and Angular Momentum. Kinematics and Dynamics of Material Point. Rigid Body Kinematics. Relative Motion. Rigid Body Dynamics in the Plane and in Space. Oscillations.

Expected learning outcomes and competences to be acquired : The course presents systematically basic knowledge of Mechanics. After the completion of the course the students should be able to handle and solve simple and / or complicated problems related to Mechanics.

Prerequisites

Teaching methods Hours of Instruction 52

Assessment methods: Final written exam (compulsory) , Intermediate written exam (optional)

Language of instruction Greek

Recommended bibliography [1] Physics, Volume A, Young Hugh D.

[2] Physics, Volume 1, HALLIDAY-RESNICK

104 Chemistry	Sm.	C.H.	ECTS
	1	4	5

Course title *Chemistry*

Course code *104*

Course type *Mandatory*

Course level *Undergraduate (first cycle)*

Year of studies *1st*

Semester *1st*

ECTS Credits *5*

URL *http://eclass.uowm.gr/courses/MECH118/*

Hours per week *4*

Instructor(s) *George Marnellos and E. Tolis*

Course content *Introduction to the basic principles of the structure of atoms, Quantum mechanical approach of atoms, Electronic configuration of atoms, Periodic system of elements, Ionic and co-valent bonds, Molecular geometry, Hybridization, Molecular orbital theory, Metallic bonds, Intermolecular forces, Chemical kinetics, Chemical equilibrium, Chemical solutions, Acids – Bases - Salts, Redox processes & electrochemistry, Spectroscopic techniques.*

Expected learning outcomes and competences to be acquired: *The course introduces the students to the basic principles of chemistry with special emphasis on inorganic and physico-chemical issues. Through lectures and exercises, students are introduces to the basic principles and applications of Chemistry that are related to the science of Mechanical Engineering (i.e., Materials, Kinetics, Thermodynamic Equilibrium, Electrochemistry, etc).*

Prerequisites *-*

Teaching methods *Hours of Instruction 52 (Theory: 26 h, Exercises: 26 h)*

Assessment methods: Final written exam (compulsory) , Midterm written exam (compulsory)

Language of instruction *Greek*

Recommended bibliography *[1] "General Chemistry. Theory and Applications", M. Konsolakis*

[2] "General Chemistry ", Ebbing-Gammon

[3] "Introduction to Inorganic and General Chemistry", N. Chatziliadis

[4] "Basic Principles in Inorganic Chemistry", N.D. Klouras

105 Introduction to Computing	Sm.	C.H.	ECTS
	1	5	5

Course title Introduction to Computing

Course code 105

Course type Mandatory

Course level Undergraduate

Year of studies 1

Semester 1

ECTS Credits 5

URL http://eclass.uowm.gr/courses/MECH154/

Hours per week 5

Instructor(s) Mavrikios Politis

Course content General computing literacy, hardware design and operation, basic problem solving techniques. Basic principles of programming using the MATLAB environment and language: the command prompt, scripts, tables, graphics and data visualization, flowcharts, selection and repetition structures, data input-output.

Expected learning outcomes and competences to be acquired: Acquire the fundamental skills in computer programming using Matlab. Upon successful completion of this course, the student will be able to formulate ways of solving simple algorithmic problems and demonstrate their solution using a high level programming language (Matlab). Another objective is to engage students in collaborative problem-solving of more complex problems by engaging them in the final group programming project.

Prerequisites

Teaching methods Lectures (13 weeks x 3 hours lectures and 2 hours practice problems)

Assessment methods Written final examination, compulsory mid-term and programming project

Language of instruction Greek

Recommended bibliography[1] Προγραμματισμός Η/Υ σε περιβάλλον Matlab, Ι. Καλατζή (“Computer programming using Matlab”, I. Kalatzis (in Greek only). Freely distributed ebook.

[2] Introduction to MATLAB for Engineers, W. Palm III, McGraw Hill, 2010

[3] online material in eclass: lecture notes, worked examples and similar.

106 Numerical Analysis	Sm.	C.H.	ECTS
	6	5	5

Course title Numerical Analysis

Course code 106

Course type Mandatory

Course level Undergraduate (first cycle)

Year of studies 3

Semester 6

ECTS Credits 5

URL http://eclass.uowm.gr/courses/MECH172/

Hours per week 5

Instructor(s) John G. Bartzis

Course content Basic concepts Basics of analysis. Approximation and Errors. Solving Nonlinear Equations. Numerical Interpolation and Polynomial Approximation. Numerical Differentiation and Integration. Ordinary Differential Equations. Direct Methods for Solving Linear Systems. Iterative Methods for Solving Linear Systems.

Expected

learning outcomes and competences to be acquired The objective of this course is to teach the student the approximate solving

of complex problems that are not amenable to exact solution by applying numerical methods and implementation of these solutions with computer programs. After the teaching of this course the student should include integrated approaches towards the principles and use of clasical methods of numerical analysis in the science of engineering with examples and applications. Furthermore, he must acquire knowledge of basic principles, in order to deepen in the future in the development and improvement of such methods.

Prerequisites Mathematical Analysis I, II, III, Introduction to Computing

Teaching methods Hours of Instruction 65 (Theory: 39, Exercises: 26)

Assessment methods: Final written exam (compulsory), Intermediate written exam (optional), Weekly exercises (compulsory).

Language of instruction Greek

Recommended bibliography [1] Αριθμητική ανάλυση με εφαρμογές σε Matlab και Mathematica, Παπαγεωργίου, Γεώργιος Σ., Εκδόσεις Συμεών.

[2] Numerical Analysis, J. Douglas Faires, Richard L. Burden, Thomson Brooks/Cole.

107 Statistics	Sm.	C.H.	ECTS
	3	5	6

Course title Statistics

Course code 107

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 2

Semester 3

ECTS Credits 6

URL http://eclass.uowm.gr/courses/MECH164/

Hours per week 5

Instructor(s) Sofia Panagiotidou

Course content Descriptive statistics: data summary and presentation, frequency distribution, histogram, characteristic values (mean, median, mode, range, variance, standard deviation). Probability theory: basic concepts, events, conditional probability, addition and multiplication law of probabilities, Bayes theorem. Probability distributions, discrete and continuous random variables, expected value, variance and standard deviation. Important distributions: Bernoulli, binomial, geometric, Poisson, uniform, exponential, gamma, normal distribution and the central limit theorem, Student, X2 and F distributions. Statistical estimation: sampling distributions, point estimation, properties of estimators, confidence intervals. Statistical hypotheses: hypothesis testing, type I and type II errors, required sample size, goodness of fit tests.

Expected learning outcomes and competences to be acquired :After the completion of the course the students should be able to apply the basic concepts and techniques of probability theory and statistical inference.

Prerequisites Mathematics

Teaching methods Hours of Instruction 65 (Theory: 39, Exercises: 26)

Assessment methods: Final written exam (compulsory), Intermediate written exam and/or assignments (optional)

Language of instruction Greek

Recommended bibliography [1] Statistics, D. P. Psoinos. Zitis Publ., 1999.

[2] Probability and Statistics for Engineers, G. Ch. Zioutas, Zitis Publ., 2013.

108 Machine Elements I – Mechanical Engineering Laboratory	Sm.	C.H.	ECTS
	4	5	6.5

Course title *Machine Elements I – Mechanical Laboratory*

Course code *108*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *2*

Semester *4*

ECTS Credits *6,5*

URL

Hours per week 5

Instructor(s) *Mirisidis John*

Course content *Introduction to engineering analysis, Load, stress and strain, Normal, torsional, bending and transverse shear stresses and strains, Failure prediction for static and dynamic loading, Operating stresses, Calculation of static and dynamic strength, Combined stresses and equivalent stresses, Permissible stresses, Strength safety factors, Fasteners and screws. Welded joints.*

Expected learning outcomes and competences to be acquired : Presentation, understanding and application of principles and rules in machine elements and mechanical designing, through the analysis of simple machine elements.

Prerequisites *Statics, Strength of Materials, Mechanical Drawing*

Teaching methods *Hours of Instruction 65 (Theory: 39, Exercises: 26) and 1 semester exercise (optional)*

Assessment methods: Final written exam (compulsory) , Intermediate written exam and exercise (optional)

Language of instruction *Greek*

Recommended bibliography *[1]* *Machine Elements, Graikousis R., 2nd volume, Giapoulis S. & SIA O.E. Publ., 2013.*

[2] *Machine Elements, Niemann G., Fountas G.C. Publ., 2013.*

109 Science and Technology of Materials I

Sm.	C.H.	ECTS
2	5	6

Course title *Science and Technology of Materials I*

Course code *109*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *1*

Semester *2*

ECTS Credits *6*

URL *http://eclass.uowm.gr/courses/MECH109/*

Hours per week *5*

Prerequisites: *Physics, Chemistry*

Course content*: Atomic structure, atomic bonds links (heteropolar, covalent, metallic, secondary links). Crystallography and Krystallodomi (crystalline systems, Bravais lattices, elementary cells, directions, levels, measuring density, mono-and poly-crystalline materialscrystal structure, structure verification diffraction X-ray crystal structure imperfections (point, linear, flat, three-dimensional) . granules, grain microstructure limits, microscopy, particle size. Mobility of atoms and Diffusion in solid state (mechanisms, laws of Fick). equilibrium phase diagram (solid solutions, thermodynamic interpretation of Gibbs law, binary diagrams). Physical Properties (Electrical, Thermal, Magnetic, Optical). Oxidation, Corrosion and Protection.*

Expected learning outcomes and competences to be acquired*: Introduction to basic concepts of structure and material properties as functions of microstructure and processing. Standard materials are metallic materials, but also considered are non-metallic (ceramic, polymer for which are developed the relationships governing the physical properties.*

Teaching: *Lectures*

Assesment: *100% written exam,*

110 Strength of Materials

Sm.	C.H.	ECTS
3	5	6.5

Course title *Strength of Materials*

Course code *110*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *2*

Semester *3*

ECTS Credits *6,5*

URL *http://eclass.uowm.gr/courses/MECH155/*

Hours per week 5

Instructor(s) Mirisidis John

Course content Axial Loading, Centric & Eccentric Loading, Shearing Stress, Bearing Stress in Connections, Stress Under General Loadings, Rod & Boom Normal Stresses, State of Stress, Factor of Safety, Normal Strain, Hooke's Law: Modulus of Elasticity, Elastic vs. Plastic Behavior, Fatigue, Deformations Under Axial Loading, Static Indeterminacy, Thermal Stresses, Poisson's Ratio, Relation Among E, v, and G, Composite Materials, Generalized Hooke's Law, Shearing Strain, Saint-Venant's Principle, Stress Concentration, Plastic Deformations, Residual Stresses

Torsion: Torsional Loads on Circular Shafts, Axial Shear Components, Shaft Deformations, Shearing Strain, Stresses in Elastic Range, Angle of Twist in Elastic Range, Statically Indeterminate Shafts, Design of Transmission Shafts, Stress Concentrations, Plastic Deformations, Residual Stresses, Torsion of Noncircular Members, Thin-Walled Hollow Shafts.

Pure Bending: Symmetric Member in Pure Bending, Bending Deformations, Strain Due to Bending, Deformations in a Transverse Cross Section, Bending of Members Made of Several Materials, Stress Concentrations, Eccentric Axial Loading in a Plane of Symmetry, Asymmetric Bending, General Case of Eccentric Axial Loading.

Transverse Loading: Basic distributional assumption of normal stresses, Determination of the Shearing Stress in Common Types of Beams, Further Discussion of the Distribution of Stresses in a Narrow Rectangular Beam, Longitudinal Shear on a Beam Element of Arbitrary Shape, Shearing Stresses in Thin-Walled Members, Plastic Deformations, Multi Loading stresses, Asymmetric Loading of Thin-Walled Members.

Transformations of Stress and Strain: Transformation of Plane Stress, Principal Stresses, Maximum Shearing Stress, Mohr's Circle for Plane Stress, Application of Mohr's Circle to the Three-Dimensional Analysis of Stress, Yield Criteria for Ductile Materials and Fracture Criteria for Brittle Materials Under Plane Stress, Stresses in Thin-Walled Pressure Vessels, Transformation of Plane Strain, Mohr's Circle for Plane Strain, Three-Dimensional Analysis of Strain, Measurements of Strain.

Expected learning outcomes and competences to be acquired : Introduction to the concepts of deformable solid body by applying the principles of the theory of elasticity. Acquisition of knowledge to analyze stresses (strains) in specific components, or machines elements or mechanisms, with specific support, for standard or anticipated external loads applied in certain methods (tension, compression, torsion, bending, eccentric axial loading), and determination of the expected mechanical behavior, based on accurate design or validation for their safe operation.

Prerequisites Statics, Science and Technology of Materials I, II

Teaching methods Hours of Instruction 65 (Theory: 26, Exercises: 39)

Assessment methods: Final written exam (compulsory) , Intermediate written exam (optional)

Language of instruction Greek

Recommended bibliography

[1] Mechanics of Materials, Beer F. P., Johnston R. E., Tziolas Publ., 2012.

[2] Strength of Materials, Papamixos E., Charalampakis N., Tziolas Publ., 2004.

111 Engineering Statics	Sm.	C.H.	ECTS
	2	5	6

Course title Engineering Statics

Course code 111

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1

Semester 2

ECTS Credits 6

URL http://eclass.uowm.gr/courses/MECH151

Hours per week 5

Instructor(s) Nickolas S. Sapidis

Course content Force and moment. Addition and resolution of forces. Free body diagram. Equilibrium conditions. Elementary structures: rods, beams, cables. Advanced structures: frames, trusses. N-Q-M diagrams. Friction: brakes, clutches, couplings, belts. Center of mass. Moments of Inertia.

Expected learning outcomes and competences to be acquired Understanding of basic concepts related to the various types of structures, their supports, and the loads (external and internal) acting on them. Understanding and ability to apply solution methods to static problems.

Prerequisites (recommended) Mathematics I, Physics, Linear Algebra

Teaching methods Lectures (13 weeks x 2,5 hour of Theory and 2,5 hours of Exercises)

Assessment methods: Final written exam

Language of instruction Greek

Recommended bibliography [1] P.A. VOUTHOUNIS, “STATICS”, Publisher: P.A. VOUTHOUNIS, 2008 (in Greek).

[2] W. WAGNER, G. ERLHOF, “APPLIED STATICS”, Publisher: KLEIDARITHMOS, 2012 (in Greek).

112 Dynamics	Sm.	C.H.	ECTS
	4	5	6.5

Course title *Dynamics*

Course code *112*

Course type *Mandatory*

Course level *Undergraduate*

Year of studies *2*

Semester *4*

ECTS Credits *6.5*

URL *http://eclass.uowm.gr/courses/MECH127*

Hours per week *5*

Instructor(s) *Dimitrios Giagopoulos*

Course content Kinematics of particles (position vector, velocity, acceleration, rectangular coordinates, cylindrical coordinates, tangential coordinates, relative motion), Kinetics of particles (Newton’s and Euler’s laws of motion, principles of impulse and momentum, principles of work and energy), Kinematics of rigid bodies (translation, pure rotation, plane motion, rotation about a fixed point, spatial motion, relative motion), Kinetics of rigid bodies (inertia tensor, Newton’s and Euler’s laws of motion, principles of impulse and momentum, principles of work and energy, inertia forces), Applications (eccentric impact, balancing of rotating rigid bodies, axisymmetric rigid body rotation).

Expected learning outcomes and competences to be acquired: Understanding the basic principles of dynamics, develop the equations of motion of systems particles and rigid bodies and solves simple examples with analytical and numerical methods.

Prerequisites *Statics*

Teaching methods *Lectures (13 weeks x 3 hour of Theory and 2 hours of Exercises) and homeworks.*

Assessment methods: Final written exam

Language of instruction *Greek*

Recommended bibliography *[1] Dynamics, S. Natsiavas, Zitis Publ.(in Greek), 1994.*

[2] Dynamics, Beer - Johnston, Tziolas Publ.(in Greek), 2010.

113 Mechanical Drawing I	Sm.	C.H.	ECTS
	1	4	5.5

Course title Mechanical Drawing I

Course code 113

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1

Semester 1

ECTS Credits 5,5

URL http://eclass.uowm.gr/courses/MECH115

Hours per week 4

Instructor(s) Nickolas S. Sapidis

Course content Fundamental ISO rules for drawing (types of technical drawings, drawing tools and sheets, title block, parts list, drawing scales, types of lines and line widths, lettering), Introduction to Computer-Aided Design/Drafting (CAD), Views and representation of mechanical components (types of views, technical sketch, construction drawing, assembly drawing, rules and basic conventions for views), Dimensions (ISO rules and principles for dimensioning, special symbols for dimensioning, basic methods and paradigms for dimensioning, dimensions for CNC processing), Sections (general principles and rules for drawing sections, special types of sections, sections in multiple cutting planes), Drawing of connection elements (geometric features and categories of threads, standard threads, drawing of thread holes, dimensions and types of screws, standardization of bolts, nuts and tools, bolted joints and related components, rivets, welding methods and drawing of welds).

Expected learning outcomes and competences to be acquired Understanding and ability to apply basic principles, standards and ISO rules of mechanical drawing. Ability to produce an ISO-compatible drawing for a low-complexity mechanical component.

Prerequisites

Teaching methods Lectures (13 weeks x 2 hour of Theory and 2 hours of Drawing Exercises)

Assessment methods: Final written exam

Language of instruction Greek

Recommended bibliography [1] A. Antoniadis, "Mechanical Drawing", 2nd Ed., Tziolas Publications, 2013 (in Greek).

[2] K.-D. Bouzakis, "Rules of Mechanical Drawing", ZHTH Publications, 2003 (in Greek).*ses*

Student Evaluation: One Written Examination

114 Fundamentals of Machining	Sm.	C.H.	ECTS
	4	5	6

Course title Fundamentals of Machining

Course code 114

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 2

Semester 4

ECTS Credits 6

URL

Hours per week 5

Instructor(s) Mirisidis John

Course content Introduction to engineering analysis, Load, stress and strain, Normal, torsional, bending and transverse shear stresses and strains, Failure prediction for static and dynamic loading, Operating stresses, Calculation of static and dynamic strength, Combined stresses and equivalent stresses, Permissible stresses, Strength safety factors, Fasteners and screws. Welded joints.

Expected learning outcomes and competences to be acquired: Presentation, understanding and application of principles and rules in machine elements and mechanical designing, through the analysis of simple machine elements.

Prerequisites Science and Technology of Materials I & II, Strength of Materials

Teaching methods Hours of Instruction 65

Assessment methods: Final written exam (compulsory)

Language of instruction Greek

Recommended bibliography [1] Manufacturing of non-cohesive material. Introduction to machining of solid matter, Bouzakis K.-D., Ziti Publ., 2013.

[2] Machining Technology, Petropoulos, P. G., Ziti Publ., 1992.

116 Electrotechnics	Sm.	C.H.	ECTS
	5	5	5

Course title Electrotechnics

Course code 116

Course type Mandatory

Course level Undergraduate (first cycle)

Year of studies 3

Semester 5

ECTS Credits 5

URL http://eclass.uowm.gr/courses/ICTE163/

Hours per week 5

Instructor(s) Theodoros Theodoulidis

Course content Current, voltage, power. Kirchhoff's laws and Tellegen's theorem. Electric components. dc and ac circuits. Methods of analysis of electric circuits in the sinusoidal steady state. Theorems of electric circuits. Power and energy in circuits with sinusoidal excitation. Power factor correction. Symmetric and asymmetric three phase circuits. Analysis of circuits with periodical non-sinusoidal excitation. Harmonics and Fourier series. Diodes and rectifying devices.

Expected learning outcomes and competences to be acquired : The student is introduced in the basic knowledge of theory and analysis of electric circuits. He/she will be able to analyze basic dc and ac electric circuits in order to be able to follow the courses of Electric Machines and Electromechanical Applications. With the help of the laboratory exercises he/she better assimilates the theory and also obtains capabilities in the use of software for the design and analysis of electric circuits.

Prerequisites -

Teaching methods Hours of Instruction 57 (Theory: 39, Laboratory: 18)

Assessment methods: Final written exam (compulsory) , Laboratory assignments (compulsory)

Language of instruction Greek

Recommended bibliography [1] Analysis of electric circuits, N. Margaris, Tziolas Editions, 2009.

[2] Electric Circuits, J. Edminister, ESPI Editions, 1980.

117 Electrical Machines	Sm.	C.H.	ECTS
	6	5	5

Course title Electric Machines
Course code 117
Course type Mandatory
Course level Undergraduate (first cycle)
Year of studies 3
Semester 6
ECTS Credits 4
URL http://eclass.uowm.gr/courses/MECH170/
Hours per week 4
Instructor(s) Theodoros Theodoulidis
Course content Basic principles of electromagnetism and ac and dc electric machines. Equivalent circuits. dc motors. Three phase and single-phase induction motors. Synchronous motors. Load curves (torque-speed). Speed control, starting and motor selection.
Expected learning outcomes and competences to be acquired The student is introduced to the basic principles of electrical machinery. Learns to analyze the basic types of electric motors in order to obtain information about their efficiency and load curves. Can also study driver systems depending on the required application/setup. In the lab he/she assimilates better the basic configurations and obtains real experience.
Prerequisites Electrotechnics
Teaching methods Hours of Instruction 52 (Theory: 40, Laboratory: 12)
Assessment methods: Final written exam (compulsory) , Laboratory assignments (compulsory)
Language of instruction Greek
Recommended bibliography [1] Electric Machines, S. Chapman, 4th edition, Tziolas Editions, 2009.
[2] Electric Machines, C. Hubert, ION Editions, 2008.

118 Heat Transfer	Sm.	C.H.	ECTS
	5	5	5.5

Course title Heat Transfer
Course code 118
Course type Compulsory
Course level Undergraduate (first cycle)
Year of studies 3
Semester 5
ECTS Credits 5.5
URL http://eclass.uowm.gr/courses/MECH105/
Hours per week 5
Instructor(s) E. Konstantinidis
Course content Introduction to the mechanisms of heat transfer: conduction, convection and radiation.

Conduction: Fourier's law, thermal conductivity, heat diffusion equation in Cartesian, polar and spherical coordinates.
Steady-state conduction: heat resistance concept, critical radius of insulation, multi-dimensional configurations (analytical, graphical and numerical solutions), shape factor in common configurations, heat-transfer enhancement via fins.
Transient heat conduction: Biot number, lumped-capacitance method, analytical solutions in simple geometries, Heissler charts, semi-infinite media.
Forced convection: Newton's law of cooling, local and average heat-transfer coefficient, Nusselt number, Prandtl number, Reynolds number, dimensional analysis, analogy between heat/mass and momentum transport, internal and external flows, laminar and turbulent flow, flow and heat transfer over flat plates, cylinders and tube bundles, flow and heat transfer inside pipes.
Natural convection: natural convection currents, Grashof number, Rayleigh number, natural convection over open surfaces and enclosed regions, Bernard convection cells, combined natural and forced convection.
Boiling and condensation: pool boiling, boiling curve, empirical relationships for nucleate boiling, tube boiling, drop and film condensation, condensation over tubes and tube bundles.
Thermal radiation: fundamentals of electromagnetic radiation and waves, Wien's displacement law, black-body radiation, Stefan-Boltzmann equation, interaction between radiation and real surfaces, heat exchange between surfaces, view factor.
Expected learning outcomes and competences to be acquired : 1) understand the fundamental mechanisms of heat transfer, 2) acquire the knowledge base for related engineering problems, 3) develop skills for the solution of problems involving heat transport, 4) recognize heat transfer problems for further study
Prerequisites Thermodynamics I, Mathematics I, II
Teaching methods lectures and tutorials
Assessment methods 15% coursework (x3), 85% final written exam
Language of instruction Greek
Recommended bibliography [1] Heat and Mass Transfer, Cengel Yunus., Ghajar A., McGraw Hill (translated into greek)
[2] Principles of Heat and Mass Transfer, Kakatsios, X., Symeon, 2006 (in greek)
[3] A Heat Transfer Textbook, Lienhard J. H. (iv) and Lienhard J. H. (v) Phlogiston Press, 2003. (freely available online)

119 **Thermodynamics I**	Sm.	C.H.	ECTS
	3	5	6.5

Course title Thermodynamics I
Course code 119
Course type Mandatory Course
Course level Undergraduate
Year of studies 2
Semester 3
ECTS Credits 6.5
URL http://eclass.uowm.gr/courses/MECH153/
Hours per week 5
Instructor(s) Tomboulides Ananias
Course content Basic principles of Thermodynamics. The First Law of Thermodynamics in closed systems, properties of pure substances, Phase diagrams for gases and liquids, equations of State, the First Law of Thermodynamics for open flowing systems, The Second Law of Thermodynamics, Entropy and the third Law, Power, refridgeratιon and heating cycles, Gas and vapor cycles: Carnot, Otto, Diesel, Brayton, Rankine.
Expected
learning outcomes and competences to be acquired: Course focuses on the understanding of the fundamental concepts and principles in thermodynamics with emphasis on the solution of engineering problems and on the analysis of energy systems and flow processes.
Prerequisites Mathematics I, Mathematics II, Physics
Teaching methods Oral presentations and exercises
Assessment methods Written exam, 70% final exam, 30% midterm exam
Language of instruction Greek
Recommended bibliography [1] Thermodynamics: An Introduction to the Fundamentals and Applications, Hans Dieter Baehr, 2011
[2] Thermodynamics, An Engineering Approach, 3rd edition, Dr. Y. Cengel, Dr. M. Boles
[3] Fundamentals of Engineering Thermodynamics, M. J. Moran, H. N. Shapiro

120 Fluid Mechanics I	Sm.	C.H.	ECTS
	4	5	6

Course title Fluid Mechanics I

Course code 120

Course type Mandatory

Course level Undergraduate (first cycle)

Year of studies 2

Semester 4

ECTS Credits 6

URL http://eclass.uowm.gr/courses/MECH103/

Hours per week 5

Instructor(s) Eustathios Kikkinides

Course content Basic definitions. Properties of fluids. Fluid Statics: Measurement of pressure, hydrostatic forces, buoyancy and Archimedes's law. Introduction to Fluid Dynamics: Bernoulli's equation and its applications. Kinematics of fluids, Eulerian and Lagrancian description of flow. Reynolds transport theorem. Control volume formulation and application in mass, momentum and energy conservation. Differential analysis of flow fields: stream function, vorticity and potential; elementary ideal, potential, flows and their combinations, examples and applications. Continuity equation, Euler and Navier Stokes equations of motion, Energy equation and their applications. Viscous flows and their application in simple geometries: Poiseuille flow in a slit channel and a cylinder, Quette flow. Dimensional analysis, similarity and dimensionless numbers. Π- Buckingham's theorem. Flow in tubes: Fully developed flow, introduction to turbulence and the concept of the boundary layer. Dimensional analysis and the use of Moody's charts to determine the pressure drop in smooth and rough tubes.

Expected

learning outcomes and competences to be acquired: This course aims in the in depth understanding of the basic principles of Fluid Mechanics and also serves as an introduction to advanced applications of flow of real fluids. The student acquires fundamental knowledge on the phenomenology and the mathematical description of real flows and learns to use this knowledge in solving practical problems. For example the application of Bernoulli's equation for ideal flows, the application of Poiseuille's equation for viscous flows, the measurement of hydrostatic pressure, the determination of pressure drop in tubes, etc.

Prerequisites Physics, Mathematics II, Thermodynamics I

Teaching methods Hours of Instruction 63 (Theory: 39, Exercises: 26)

Assessment methods: Final written exam (75% of the final grade) , optional mid term exam (25% of the final grade)

Language of instruction Greek

Recommended bibliography 1. Fluid Mechanics, Goulas A. (in Greek).

2. Fluid Mechanics, Tsaggaris S. (in Greek).

3. Fluid Mechanics with Student CD, WHITE F.

123 Industrial Management	Sm.	C.H.	ECTS
	6	5	5.5

Course title Industrial Management

Course code 123

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 3

Semester 6

ECTS Credits 5.5

URL http://eclass.uowm.gr/courses/MECH177/

Hours per week 5

Instructor(s) Sofia Panagiotidou

Course content Introduction to production operations. Forecasting: time series and causal models; constant, linear-trend and seasonal models. Design of Production Systems: product design; process selection and capacity planning; facilities layout. Planning and Control of Production Systems: long, medium and short range production planning; inventory management; quality control; equipment maintenance and replacement.

Expected learning outcomes and competences to be acquired: After the completion of the course the students should be able to understand the role and interrelations of the main operations and decision making tools in production systems (such as inventory control, equipment maintenance, quality control, demand forecasting, production planning), and their interactions to the external environment.

Prerequisites Statistics, Operations Research

Teaching methods Hours of Instruction 65 (Theory: 39, Exercises: 26)

Assessment methods: Final written exam (compulsory), Intermediate written exam and/or assignments (optional)

Language of instruction Greek

Recommended bibliography [1] Management of Production Systems, S. G. Dimitriadis, A. N. Michiotis, Kritiki Publ., 2007.

[2] Operations Management, J.K. Shim, J.G. Siegel, Kleidarithmos Publ., 2002.

127 Alternative Energy Systems	Sm.	C.H.	ECTS
	6	4	**4**.5

Course title *New & Renewable Energy Sources*

Course code *127*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *3*

Semester *6*

ECTS Credits *4.5*

URL *http://eclass.uowm.gr/courses/MECH132/*

Hours per week 4

Instructor(s) George SKODRAS

Course content Introduction to energy policy issues. Energy in the European Union. The EU Green Bible for the security of the energy supply. The EU White Bible for the Renewable Energy Sources. Energy reserves and resources. The Greek energy system. Solar energy-basic principles. Solar collectors and photovoltaics. Wind energy and wind parks. Energy from biomass. Energy utilization of biomass. Hydropower and power plants – Advantages and disadvantages. Geothermal energy and geothermal fields. Tidal and wave energy. Ocean thermal energy. Energy conservation. Thermodynamic analysis of the renewable energy systems. Environmental analysis of the renewable energy systems. Social and economic impacts.

Expected learning outcomes and competences to be acquired : The course presents systematically the renewable energy sources the systems and the cutting edge developments. After the completion the students will be able to approach effectively the issues of RES and to handle design and implementation problems, by means of scientifically rigorous quantitative methods.

Prerequisites Thermodynamics, Mathematics, Statistics

Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26) – Home works 3

Assessment methods : Final written exam (compulsory) , Intermediate written exam (optional)

Language of instruction Greek

Recommended bibliography [1] Ήπιες μορφές ενέργειας, Έκδοση 1η 2008, Παπαϊωάννου Γ.

[2] Ήπιες μορφές ενέργειας, Έκδοση 1η 2008, Κανελλοπούλου Ελ.

[3] Ήπιες μορφές ενέργειας Ι – Περιβάλλον και Ανανεώσιμες Πηγές Ενέργειας, Έκδοση 1η 2003, Καπλάνης Σ.

[4] Ήπιες μορφές ενέργειας, Έκδοση 1η 2006, Κουτσούμπας Χρ.

[5] Συμβατικές & Ήπιες μορφές ενέργειας, Έκδοση 1η 2006, Κ. Μπαλάρας, Α. Αργυρίου, Φ. Καραγιάννης

131 Environmental Technology	Sm.	C.H.	ECTS
	6	4	4.5

Course title *Environmental Technology*

Course code *131*

Course type *Mandatory*

Course level *Undergraduate (first cycle)*

Year of studies *3rd*

Semester *6th*

ECTS Credits *4.5*

URL *http://eclass.uowm.gr/courses/MECH119/*

Hours per week *4*

Instructor(s) *George Marnellos and E. Papista (Teaching Assistant)*

Course content *Environmental/Atmospheric pollution, Sources of environmental pollution, Effects of environmental pollution to human health, flora, fauna and materials, Greenhouse effect, Depletion of ozone layer, Acid deposition, Photochemical smog, Atmospheric chemistry, Analysis of gaseous pollutants, Pollution control technologies for stationary and mobile sources, Particulate matter, Technologies for particulate matter control (Cyclones, Electrostatic Precipitators, Baghouses), VOCs, SOX and NOX abatement and control.*

Expected

learning outcomes and competences to be acquired: The course presents to students the effects of various human activities on the environment. Specifically, the causes, trends and technological solutions to address the environmental problems that are related to air pollution (gaseous and particulate pollutants) from stationary and mobile sources, are presented. Moreover the students learn to design control pollution technology systems from technological and economic point of view.

Prerequisites *-*

Teaching methods *Hours of Instruction 52 (Theory: 26 h, Exercises: 26 h)*

Assessment methods: Final written exam (compulsory) , Midterm written exam (optional)

Language of instruction *Greek*

Recommended bibliography *[1] "Air Pollution Control", D. Cooper και C. Alley*

[2] "Air Pollution. Effects, Control and Alternative Technologies", I. Yentekakis

[3] "Introduction to Environmental Engineering", A. Koungolos

132 Mathematical Analysis III	Sm.	C.H.	ECTS
	3	4	5

Course title *Applied Mathematics I*

Course code *132*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *2nd*

Semester *3rd*

ECTS Credits *5*

URL *eclass.uowm.gr/courses/ICTE109/*

Hours per week *4*

Instructor(s) Theodoros Zygiridis (Assistant Professor)

Course content Introduction. First-order ordinary differential equations. Separable equations. Exact equations, integrating factors. Linear equations. Solution via substitution. Higher-order ordinary differential equations. Linear equations with constant coefficients. Order reduction. Solution of inhomogeneous differential equations. Laplace transform and its use for solving differential equations. Series solution of differential equations, ordinary and singular points. Systems of differential equations, solution with the matrix method. Complex numbers. Complex functions. Differentiation of complex functions. Integration of complex functions.

Expected learning outcomes and competences to be acquired: Upon successful completion of this course, students will be able:

- to recognize the mathematical models for certain physical problems,
- to identify the general form of differential equations,
- to apply appropriate methods for determining partial and general solutions,
- to solve initial value problems,
- to determine solutions in the form of power series,
- to exploit the Laplace transform,

- to solve systems of differential equations,
- to graphically solve certain types of differential equations,
- to deal with fundamental problems of complex analysis.

Prerequisites Elements of the following courses are required:

- Mathematical Analysis I
- Mathematical Analysis II
- Linear Algebra

Teaching methods Lectures, exercises
Assessment methods Written final exam (100%)
Language of instruction Greek
Recommended bibliography:

[1] W. E. Boyce - R. C. Diprima, Στοιχειώδεις Διαφορικές Εξισώσεις & Προβλήματα Συνοριακών Τιμών, ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ, 1999.
[2] Τραχανάς Στέφανος, Συνήθεις Διαφορικές Εξισώσεις, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2008.
[3] Κάρολος Σεραφειμίδης, Διαφορικές Εξισώσεις, Εκδόσεις "σοφία", 2010.
[4] Σταυρακάκης Νίκος, Συνήθεις Διαφορικές Εξισώσεις, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ ΟΕ, 2010.
[5] David Logan, J., A First Course in Differential Equations [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.
[6] Soare, Mircea V. Teodorescu, Petre P. Toma, Ileana, Ordinary Differential Equations with Applications to Mechanics [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

133 Thermodynamics II	Sm.	C.H.	ECTS
	6	5	5.5

Course title Thermodynamics II
Course code 133
Course type Mandatory Course
Course level Undergraduate
Year of studies 3
Semester 6
ECTS Credits 5.5
URL http://eclass.uowm.gr/courses/MECH129/
Hours per week 5
Instructor(s) Tomboulides Ananias
Course content Thermodynamic System Equilibrium, Gibbs and Helmholtz functions. Combustion processes. Stoichiometry in complete combustion, application of the first law of thermodynamics in combustion processes, heating value, enthalpy of reaction. Application of the second law in combustion processes. Thermodynamic relations, Maxwell’s equations. Thermodynamic properties of systems with fixed chemical composition, ideal gases and mixtures. Thermodynamic properties of gaseous mixtures of variable composition. Chemical potential and chemical equilibrium. Dissociation.
Expected learning outcomes and competences to be acquired: This course focuses on understanding the theoretical fundamentals of thermodynamic system equilibrium, thermodynamic relations, thermodynamic properties of mixtures of fixed and variable composition with emphasis on combustion processes and chemical equilibrium phenomena.
Prerequisites (Mathematics I, Mathematics II, Physics) Thermodynamics I
Teaching methods Oral presentations and exercises
Assessment methods Written exam , 70% final exam, 30% midterm exam
Language of instruction Greek
Recommended bibliography [1] Advanced Engineering Thermodynamics, Rowland S.Benson, 2nd edition
[2] Thermodynamics, An Engineering Approach, 3rd edition, Dr. Y. Cengel, Dr. M. Boles
[3] Thermodynamics: An Introduction to the Fundamentals and Applications, Hans Dieter Baehr, 2011

135 Science and Technology of Materials II	Sm.	C.H.	ECTS
	3	5	6

Course title Science and Technology of Materials II
Course code 135

Course type Compulsory
Course level Undergraduate (first cycle)
Year of studies 2nd
Semester 3rd
ECTS Credits 6
URL
Hours per week 5
Instructor: F. Stergioudi

Course content: Lubrication and lubricants. Seals. Classical hydrodynamic lubrication theory. Plain bearings. Power transmission. Belts. Gears and gearboxes. Design and analysis of complex engineering structures.
Expected learning outcomes and competences to be acquired: The presentation and understanding of the basic rotational components and power transmission. Analysis and design of complex engineering structures

Prerequisites: Statics, Strength of Materials, Mechanical Drawing, Machine Elements I
Teaching: Lectures and tutorials
Assessment: Final Exam

137 Mathematical Analysis IV

	Sm.	C.H.	ECTS
	4	4	5

Course title Applied Mathematics II
Course code 137
Course type Compulsory
Course level Undergraduate (first cycle)
Year of studies 2nd
Semester 4th
ECTS Credits 5
URL eclass.uowm.gr/courses/ICTE217/
Hours per week 4
Instructor(s) Theodoros Zygiridis (Assistant Professor)
Course content Introduction to Partial Differential Equations (PDEs). Examples of PDEs. First-order PDEs. Linear, semi-linear, and quasi-linear PDEs. Characteristic curves. The Cauchy problem. Second-order PDEs, classification, standard forms. Eigenvalue problems. The Laplace equation, solution in Cartesian and polar coordinates, cases of homogeneous and inhomogeneous boundary conditions and infinite domains. Orthogonal functions, Fourier series and Fourier integrals. The heat equation, solution in finite and infinite spaces. Special functions. The wave equation, finite and infinite strings.
Expected learning outcomes and competences to be acquired Upon successful completion of this course, students will be able:

- to identify different types of PDEs,
- to derive the mathematical models for different problems,
- to solve PDES with the method of characteristics,
- to deal with eigenvalue problems,
- to reduce PDES to their canonical forms,
- to apply separation of variables and other techniques for the solution of PDEs,
- to solve problems in different coordinate systems,
- to solve problems in finite, semi-infinite or infinite spaces,
- to use orthogonal functions and exploit Fourier series and integrals.

Prerequisites:

- Linear Algebra
- Mathematical Analysis II
- Applied Mathematics I

Teaching methods Lectures, exercises
Assessment methods Written final exam (100%)
Language of instruction Greek
Recommended bibliography
[1] ΤΡΑΧΑΝΑΣ ΣΤΕΦΑΝΟΣ, ΜΕΡΙΚΕΣ ΔΙΑΦΟΡΙΚΕΣ ΕΞΙΣΩΣΕΙΣ, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2009.

[2] Παντελίδης Γεώργιος Ν., Κραββαρίτης Δημήτρης, Εισαγωγή στις διαφορικές εξισώσεις μερικών παραγώγων, Ζήτη, 2003.
[3] Κυβεντίδης Θωμάς, Μερικές διαφορικές εξισώσεις, Ζήτη , 2009.
[4] Tveito, Aslak. Golubitsky, M.Jäger, W.Marsden, J.E. Sirovich, L. Winther, Ragnar, Introduction to Partial Differential Equations [electronic resource], Heal- Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.
[5] Myint-U, Tyn.Debnath, Lokenath, Linear Partial Differential Equations for Scientists and Engineers [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

138 Machine Elements II	Sm.	C.H.	ECTS
	5	5	5.5

Course title *Machine Elements II*

Course code *138*

Course type *Compulsory*

Course level *Undergraduate (first cycle)*

Year of studies *3*

Semester *5*

ECTS Credits *5,5*

URL *http://eclass.uowm.gr/courses/MECH121/*

Hours per week *5*

Instructor(s) *Mirisidis John*

Course content *Lubricants and lubrication, Hydrodynamic bearings and seals, Shafting and associated parts, Power transmission, Flat, synchronous and V-belts, Parallel axis gears, Planetary gear trains, Nonparallel coplanar and non-coplanar gears, Gearboxes, Design of power transmission systems.*

Expected learning outcomes and competences to be acquired : Presentation and understanding of basic rotary motion elements and power transmission and analytical presentation of the necessary figures and calculations in order to analyze and synthesize mechanical engineering.

Prerequisites *Statics, Strength of Materials, Mechanical Drawing, Machine Elements I*

Teaching methods *Hours of Instruction 65 (Theory: 39, Exercises: 26) and 1 semester exercise (optional)*

Assessment methods: Final written exam (compulsory) , Intermediate written exam and exercise (optional)

Language of instruction *Greek*

Recommended bibliography *[1] Machine Elements, Graikousis R., 2nd volume, Giapoulis S. & SIA O.E. Publ., 2013.*

140 Mechanical Vibration and Machine Dynamics	Sm.	C.H.	ECTS
	5	5	5.5

Course title *Mechanical Vibration and Machine Dynamics*

Course code *140*

Course type *Mandatory*

Course level *Undergraduate*

Year of studies *3*

Semester *5*

ECTS Credits *5.5*

URL *http://eclass.uowm.gr/courses/MECH107*

Hours per week *5*

Instructor(s) *Dimitrios Giagopoulos*

Course content *Free vibration and forced response of single degree of freedom linear oscillators to impulsive, harmonic, periodic and transient excitation (natural frequency, damping ratio, resonance). Response of multiple degree of freedom linear oscillators (formulation of the equations of motion, determination of natural frequencies and mode shapes, modal analysis). Axial, torsional and bending vibration of bars. Applications (measurement and evaluation of vibration characteristics, vibration isolation, vibration absorption, balancing, torsional vibration). The course, beyond the theoretical teaching, introduces the student and into programming, based on application programs in an environment of MATLAB.*

Expected learning outcomes and competences to be acquired: Understanding the basic principles of oscillatory phenomena in mechanical structures, the basic principles of finite element method and the study of practical applications in industry.

Prerequisites Dynamics

Teaching methods Lectures (13 weeks x 3 hour of Theory and 2 hours of Exercises) and homeworks.

Assessment methods: Final written exam

Language of instruction Greek

Recommended bibliography [1] Vibrations of Mechanical Systems, S. Natsiavas, Zitis Publ.(in Greek), 2001.

[2] Vibrations and Waves , S. Paipetis, D. Polyzos, Stella Parikou Publ.(in Greek), 2003.

141 English I Energy Resources & the Environment	Sm.	C.H.	ECTS
	1	2	2

Course title English I Energy Resources & the Environment

Course code 141

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1st

Semester 1st

ECTS Credits 2

URL eclass.uowm.gr/courses/ICTE141/

Hours per week 2

Instructor: A. Vamvakos

Prerequisites: -

Course content: The science of Mechanical Engineering, hardware and software of computer systems, global warming, climate change, recycling, pollution, renewable energy, fuel.

Expected learning outcomes and competences to be acquired : Introducing students to the technical & scientific terminology as applied to Mechanical Engineering. Reading and writing technical documents. Oral communication.

Teaching: Lectures (1 hr theory and 1 hour tutorials per week)..

Assessment: 30%: 15% Oral presentation, 15% written midterm: Mandatory participation to have right to take final exam. 70%: final written exam

142 English II Materials and Energy Production	Sm.	C.H.	ECTS
	2	2	2

Course title English I Energy Resources & the Environment

Course code 142

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1st

Semester 2nd

ECTS Credits 2

URL eclass.uowm.gr/courses/ICTE142/

Hours per week 2

Instructor: A. Vamvakos

Prerequisites: English I

Course content: Wind turbines, Steam Engines, crystallography, Combustion technology, internal combustion engines, thermodynamics.

Teaching: Lectures (1 hr theory and 1 hour tutorials per week)..

Expected learning outcomes and competences to be acquired : Introducing students to the technical & scientific terminology as applied to Mechanical Engineering. Reading and writing technical documents. Oral communication.

Assessment: 30%: 15% Oral presentation, 15% written midterm: Mandatory partetipation to have right to take final exam. 70%: final written exam.

144 Linear Algebra	Sm.	C.H.	ECTS
	1	3	3.5

Course title Linear Algebra

Course code 144

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1st

Semester 1st

ECTS Credits 3,5

URL eclass.uowm.gr/courses/ICTE211/

Hours per week 3

Instructor(s) Konstantinos Balassas (Assistant Professor with contract)

Course content Vector Calculus. Straight Lines, Surfaces and Curves in Space. Vector Spaces and Vector Subspaces. Linear independence, Bases and dimension of vector

Spaces. Matrices and Determinants. Finite-dimensional linear mappings. Matrices of linear maps. Systems of Linear Equations and Matrices. Solution of Systems of Linear Equations. Eigenvalues-Eigenvectors. Matrix

Diagonalization. Quadratic Forms.

Expected

learning outcomes and competences to be acquired Upon successful completion of this course, students will be able:

- to know and manage the general form of curves and surfaces,
- to understand and use concepts of vector spaces,
- to use matrices as tools in theoretical and numerical computations,
- to compute eigenvalues and eigenvectors,
- to compute determinants,
- to solve systems of linear equations,
- to manage and use matrix diagonalization.

Prerequisites None

Teaching methods Lectures, exercises

Assessment methods Written final exam (100%)

Language of instruction Greek

Recommended bibliography
[1] G. Strang, Γραμμική Άλγεβρα και Εφαρμογές, Πανεπιστημιακές Εκδόσεις Κρήτης, 2009.

[2] Α. Κυριαζής, Εφαρμοσμένη Γραμμική Άλγεβρα, Νικητόπουλος Ε & Σια ΟΕ, 2006.

[3] G. Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press, 2003.

[4] Τζουβάρας Θεόδωρος, Γραμμική Άλγεβρα Ι (και ΙΙ), Σαββάλας 2001.

[5] Κουτελιέρης, Σιάννη, Γραμμική Άλγεβρα για Μηχανικούς, Τζιόλας 2005.

[6] Serge, Land, Linear Algebra, Springer Verlag Berlin and Heidelberg GmbH & Co. KG, 1993.

[7] Richard C., Penney, Linear Algebra, John Wiley and Sons Ltd, 1998.

146 Mechanical Drawing II	Sm.	C.H.	ECTS

2 4 6

Course title Mechanical Drawing II

Course code 146

Course type Compulsory

Course level Undergraduate (first cycle)

Year of studies 1

Semester 2

ECTS Credits 6

URL http://eclass.uowm.gr/courses/MECH140

Hours per week 4

Instructor(s) Nickolas S. Sapidis

Course content Computer-aided mechanical drawing (CAD), Projection methods (intersections and developments of geometric solids), Manufacturing processes (surface quality, surface roughness, selection criteria for manufacturing processes, symbols and regulations, notations for heat treatments and hardness processes), Tolerances (dimensional tolerances, fits and fittings, standardization according to ISO, tolerances of form/orientation/location), Power transmission elements (shafts, bearings, wedges, splines, gear geometry and notation, types of gears, sprockets), drawing of mechanical assemblies (e.g., gearboxes), Three-dimensional (3D) representation (types of 3D representations, oblique projection, axonometric projection, perspective representation).

Expected learning outcomes and competences to be acquired : Understanding and ability to apply advanced mechanical-drawing concepts, methods and tools, related to (among others) manufacturing processes, tolerances, fits and fittings, geometric intersections and 3D representations. Ability to produce an ISO-compatible drawing for a low-complexity mechanical assembly addressing all aspects mentioned above.

Prerequisites (recommended)Mechanical Drawing I, Mathematics I, Physics, English I

Teaching methods Lectures (13 weeks x 2 hour of Theory and 2 hours of Drawing Exercises)

Assessment methods: Final written exam

Language of instruction Greek

Recommended bibliography [1] A. Antoniadis, "Mechanical Drawing", 2nd Ed., Tziolas Publications, 2013 (in Greek).

[2] K.-D. Bouzakis, "Rules of Mechanical Drawing", ZHTH Publications, 2003 (in Greek).

147 Operations Research	Sm.	C.H.	ECTS
	5	5	**5**.5

Course title Operations Research

Course code 147

Course type Mandatory

Course level Undergraduate (first cycle)

Year of studies 3

Semester 5

ECTS Credits 5.5

URL http://eclass.uowm.gr/courses/MECH165/

Hours per week 5

Instructor(s) George Nenes

Course content Introduction to optimization, mathematical programming models, variables, objective function parameters, constraints. Linear programming theory, graphical solution, Simplex method, sensitivity analysis. Linear programming problem solving using computer software (lindo, lingo, EXCEL solver). Integer programming. Branch and Bound algorithm. Binary programming. Applications to real-world problems.

Expected

learning outcomes and competences to be acquired: Understanding the basic mathematical programming (Linear and Non-linear) concepts and methods. Ability to model real-world operational problems by the development of appropriate mathematical programming models. Ability to solve mathematical programming models by employing the appropriate operations research methodologies and algorithms. The ability to handle data and solve mathematical programming models using computer software. The ability to perform sensitivity analyses on the results of operations research problems. Interpretation of the results of an operations research problem's solution.

Prerequisites *Statistics*

Teaching methods *Hours of Instruction 65 (Theory: 39, Exercises: 26)*

Assessment methods: Final written exam (compulsory) , Intermediate written exam (optional)

Language of instruction *Greek*

Recommended bibliography *[1] Case Studies of Operations Research, Vol. A, A. K. Georgiou, G. S. Oikonomou, G. D. Tsiotras. Benou Publ., 2006.*

[2] Quantitative Analysis, Vol. A and B, D. P. Psoinos. Ziti Publ., 1993.

[3] Operations Research, P. G. Ypsilantis. Propobos Publ., 2007.

[4] Quantitative Analysis for Management Decision Making, Vol. A and B, G. S. Oikonomou, A. K. Georgiou. Benou Publ., 2000.

[5] Introduction to Operations Research, Hamdy A. Taha, translation: A. I. Margaris. Tziola Publ., 2011.

149 Technology and Innovation, Introduction to Economics

Sm.	C.H.	ECTS
2	3	4

Course title *Technology and Innovation, Introduction to Economics*

Course code *149*

Course type *Compulsory Course*

Course level *Undergraduate (first cycle)*

Year of studies *1*

Semester *2*

ECTS Credits *4*

URL *http://elearn.materlab.eu/course/view.php?id=14*

Hours per week *3*

Instructor(s) *Yiannis Bakouros*

Course content *Size and business development – the overall financial budget of enterprises – investment and financing – financing and capital composition Styles – Foreign and Credit Capital – Developmental regimes – Other forms of finance – balance sheet and income statement – Indicators of profitability on invested capital – Balanced Scorecard.*

Expected

learning outcomes and competences to be acquired: The aim of this course is to introduce the student to basic economic principles, which govern the operation of the business units, to analyze the contribution of each one of them in the capital's profitability and measuring longitudinal indicators shows the effective operation of the enterprise. Also gives the student the ability to comprehend simple fundamentals that govern workplace Business Strategy, and to analyze the contribution of each aspect of the strategy to develop the business project

Prerequisites

Teaching methods *Lectures (13 wks x 2 hrs theory and 2 hrs computer based laboratory exercises) and two homework projects.*

Assessment methods *80% final written exam, 20% one homework project or/and a computer-based intermediate exam*

Language of instruction *Greek*

Recommended bibliography *Book, E. Carayiannis, Y.L Bakouros, "Innovation and Entrepreneurship: Theoty and Practice", 2010*

204 Steam Generators I

Sm.	C.H.	ECTS
7	5	5.5

Course title *Steam Generators I*

Course code *204*

Course type *Mandatory Course*

Course level *Undergraduate*

Year of studies *5*

Semester *7*

ECTS Credits *5.5*

URL *http://eclass.uowm.gr/courses/MECH162/*

Hours per week *5*

Instructor(s) *Tomboulides Ananias*

Course content Preliminary concepts. Optimization of thermodynamic efficiency in steam plants. Energy and exergy efficiency. Evolution of steam power plants. Criteria and classification of modern Steam Generators with natural and forced circulation and once-through flow. Flow of energy. Losses and boiler efficiency. Characteristic temperatures. Stoichiometric combustion and fuel-air ratio. Combustion of fuel mixtures. Incomplete combustion. Ash. Slugging and fouling. Combustion of pulverized coal. Drying and grinding of solid fuels. Solid, liquid, and gaseous fuel burners. Combined cycle power plants. Important parameters. Laboratory exercises designed for the understanding of flame geometry, emissions and heat engineering calculations.

Expected

learning outcomes and competences to be acquired: This course focuses on the understanding of the principles of operation, thermodynamic optimization and classification of steam-generation facilities. Efficiency of individual systems, combustion of solid, liquid and gaseous fuels, and combined cycle power generation.

Prerequisites *Heat Transfer, Thermodynamics II*

Teaching methods *Oral presentations and exercises*

Assessment methods *Written exam, Final exam 70%, midterm exam 30%*

Language of instruction *Greek*

Recommended bibliography *[1]* *Steam Generators I: General Principles, N. Papageorgiou*

[2] *Technical Natural Processes II: Steam Power Plant Facilities, volume B, B. A. Sotiropoulos*

[3] *Steam Power Plants, E. Kakaras*

205 Turbomachinery	Sm.	C.H.	ECTS
	8	5	5.5

Course title Turbomachinery

Course code 205

Course type Mandatory

Course level Undergraduate (first cycle)

Year of studies 4

Semester 8

ECTS Credits 5.5

URL http://eclass.uowm.gr/courses/MECH158/

Hours per week 5 (3 hours of Theory Lectures, 2 hours of exercises and tutorials)

Instructor(s) Assoc. Professor Antonios Tourlidakis

Course content Introduction. Applications and basic concepts of turbomachinery. Basic principles of fluid mechanics and thermodynamics. Velocity diagrams. Energy conversion in turbomachinery, efficiency, degree of reaction. Phase changes and cavitation. Characteristic curves of turbomachines and of systems, determination of operating point, connection in parallel and in series. Concepts of similarity, dimensional analysis, non-dimensional numbers, specific speed, non-dimensional cavitation numbers. Axial machines, airfoil theory, flow phenomena and forces on airfoils, non-dimensional numbers, cascade analysis, deviation angle. Radial equilibrium theory. Secondary flows and losses. Axial pumps, axial compressors and blowers, instability phenomena, supersonic flow compressors. Axial turbines, degree of reaction, types and mechanisms of aerodynamic losses in airfoils, turbine blade cooling. Hydraulic turbines. Centrifugal compressors and pumps, flow and velocity diagrams, manufacturing aspects, blade design, exhaust system.

Expected learning outcomes and competences to be acquired : The main aim of the course is to provide to the student to the principles governing the operation of turbomachinery. The student will gain knowledge and in depth understanding of the principles of operation, flow phenomena and design characteristics of turbomachinery components. The student will also gain experience in using specific techniques of analysis, design and selection of various classes of turbomachinery. The student will be able to use basic principles of Fluid Mechanics and Thermodynamics in order to design and analyze various types of turbomachinery such as pumps, compressors, turbines, wind turbines etc. He will learn how to effectively use open source software for aerodynamic airfoil analysis as well as software for the design and analysis of gas turbines.

Prerequisites Mathematical Analysis I, Mathematical Analysis II, Fluid Mechanics I, Fluid Mechanics II, Thermodynamics, Heat Transfer

Teaching methods Lectures, exercises, laboratory tutorials for the use of commercial software. Homework and personal assignments with the application of commercial software on real design and analysis problems. Utilization of information technology for the course management.

Assessment methods: Final examination, intermediate examination, two individual assignments

Language of instruction Greek

Recommended bibliography [1] Basic Principles of Turbomachinery, Nanousis Nanousis, Stamoutsos, ISBN: 978-960-411-414-6

[2] Basic Principles of Turbomachinery, Goulas Apostolos.

[3] Fluid Mechanics and Thermodynamics of Turbomachinery, S.L.Dixon, Elsevier, Fifth Edition.

206 Internal Combustion Engines	Sm.	C.H.	ECTS
	7	5	4.5

Course title Internal Combustion Engines
Course code 206
Course type Elective Course
Course level Undergraduate
Year of studies 4
Semester 7
ECTS Credits 4.5
URL http://eclass.uowm.gr/courses/MECH125/
Hours per week 5
Instructor(s) Kolokotronis D. – Tomboulides A.G.

Course content Energetic issues of internal combustion engines. Ideal, adopted, and real cycle. Mean pressures and efficiencies of the above cycles. Quality factor. Mechanical efficiency. Energy balances. Supercharging. Distribution, mixture formation, ignition, combustion, flame speed. Pollution due to IC Engines, pollution control. Analysis of indicator diagram. Control practices, representative operation curves at different loads. Operation at partial load. Detailed study of the real cycle of reciprocating engines. Experimental determination of representative cycle characteristics. Control. Heat losses. Basic phenomena and criteria. Cooling systems. Gas flow. Gas exchange mechanisms. Scavenging and supercharging systems.

Expected learning outcomes and competences to be acquired This course provides knowledge of the basic principles of operation and thermodynamics of the internal combustion engines as long as analysis of the operational parameters, indicator diagram, combustion and intake and exhaust processes in natural aspirated and supercharged engines. It is expected that at the end of the course, students familiarize with the above so they are able to study and understand ICE operation for various applications by means of deep study of theory and exercises.

Prerequisites Thermodynamics I, Thermodynamics II, Fluid Mechanics I

Teaching methods Oral presentations and exercises

Assessment methods: Final written exam (compulsory), course project (optional)

Language of instruction Greek

Recommended bibliography [1] Internal Combustion Engine Fundamentals, Heywood J., McGraw Hill Education, 1988

[2] Internal Combustion Engines, Energy Performance, transl. Koltsakis G., Grapholine Papouli, 2007

[3] Internal Combustion Engines, Kiriakis N., Sophia Editions, 2006

[4] Principles of Internal Combustion Piston Engines, Rakopoulos K., Fountas Editions, 1988

207 Heating, Ventilation and Air-Conditioning	Sm.	C.H.	ECTS
	7	5	5.5

Course title Heating, Ventilation and Air-Conditioning
Course code 207
Course type Elective
Course level Undergraduate (first cycle)
Year of studies 4
Semester 7
ECTS Credits 5.5
URL

Hours per week 5

Instructor: C. Koroneos
Prerequisites: Heat Transfer, Thermodynamics I
Course content: Introduction: Targets of HVAC, historic background, review of the basic principles of thermodynamics and heat transfer. Thermal comfort: definition and influencing parameters. Psychrometrics: the thermodynamic properties of moist air and the processes to control them. Heating: Compliance with legislation requirements for building insulation, computation of building heat losses, description of common heating systems, selection and sizing of heating system components. Principles of solar radiation. Air-conditioning: description of common air-conditioning systems, computation of cooling load, selection and sizing of main components and ducts. Cooling: cooling cycles with steam as a working fluid, common rerigerants, heat pumps, evaporative cooling.

Expected learning outcomes and competences to be acquired: introduce the student to the basic principles of heating, ventilation and air-conditioning (HVAC), and to the design and analysis of HVAC systems. The student is encouraged to apply the acquired knowlegde by performing two simple case-studies of HVAC system design, using computer-based methods.

Teaching: lectures and 2 student project case-studies
Assessment: 70% final exams, 30% student projects.

210 Unit Operations	Sm.	C.H.	ECTS
	8	4	4.5

Course title Unit Operations

Course code 210

Course type Elective

Course level Undergraduate (first cycle)

Year of studies 4

Semester 8

ECTS Credits 4.5

URL http://eclass.uowm.gr/courses/MECH180/

Hours per week 4

Instructor(s) Eustathios Kikkinides

Course content Introduction to the basic conservation laws: Momentum, heat and mass transfer. Absorption processes. Phase equilibrium and Henry's law. Absorption using packed towers and transfer units. Resistances to mass transfer between the two phases. Design of absorption towers for dilute and concentrated mixtures. Analytical and graphical methods. Distillation process. Phase equilibrium in binary mixtures. Ideal and azeotropic mixtures and Raoult's law. McCabe Thiele's graphical method and Lewis's computational method. Short-cut methods for the distillation of multi-component mixtures. Cooling Towers. Design using short-cut methods. Adsorption methods. Equilibrium isotherms, Langmuir's equation. Use of laboratory scale experimental breakthrough curves to design middle scale columns. Membrane processes for gas and liquid separations. Simple and complex flow models. The well mixed model; analytical expressions and design equations. Filtration methods: reverse osmosis, hyper-filtration and micro-filtration. Mechanical separations.

Expected learning outcomes and competences to be acquired: This course aims to introduce the student to traditional and novel unit operation processes used in the industry. The student understands first the basic physicochemical mechanisms of each process and then learns to design each process using short-cut or detailed (graphical or computational) methods.

Prerequisites Thermodynamics II, Introduction to Environmental Technology

Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26)

Assessment methods: Final written exam (80% of the final grade) , optional mid term exam (20% of the final grade)

Language of instruction Greek

Recommended bibliography 1) McCabe W.L.-Smith J.C. , Harriot P., 6th ed., McGraw Hill (transl. In Greek) 2003

2) Assael M., Maggiliotou C., Introduction to Unit Operations (in Greek), 1998.

3) Complementary notes by the instructor.

215 Systems Reliability, Maintenance and Safety	Sm.	C.H.	ECTS
	8	5	5.5

Course title *Systems Reliability, Maintenance and Safety*

Course code *215*

Course type *Compulsory Course*

Course level *Undergraduate (first cycle)*

Year of studies *4*

Semester *8*

ECTS Credits *5.5*

URL *http://elearn.materlab.eu/course/view.php?id=2*

Hours per week *5*

Instructor(s) *Yiannis Bakouros*

Course content *Reliability theory, reliability distributions, exponential distribution, distribution gamma, Weibull distribution, normal distribution. Systems reliability, reliability estimation, Markov reliability chains, estimation of reliability using generic parts, fault tree analysis, Monte-Carlo Simulation, Duane model. Reliability data collection, cost estimation, maintenance policies, maintenance indices, economic implications of idle time. The theory of replacement, deterministic and stochastic replacement policies. Preventive maintenance, total productive maintenance TPM, Use of simulation in maintenance*

Expected

learning outcomes and competences to be acquired *This graduate subject aims to introduce the student into the theory of reliability, maintenance and risk simple or complex mechanical parts or machines. It helps the student to combine his knowledge of theory of statistics with solving reliability problems and applying scientific based maintenance policies in any industrial environment.*

Prerequisites *Statistics*

Teaching methods *Lectures (13 wks x 2 hrs theory and 2 hrs computer based laboratory exercises) and two homework projects.*

Assessment methods *70% final written exam, 30% one homework project or/and a computer-based intermediate exam*

Language of instruction *Greek*

Recommended bibliography *Book, Y.L Bakouros, “Reliability and Maintenance”, 2010*

219 Automatic Control Systems	Sm.	C.H.	ECTS
	7	5	5.5

Course title *Automatic Control Systems*

Course code *219*

Course type *Mandatory*

Course level *Undergraduate (first cycle)*

Year of studies *4*

Semester *7*

ECTS Credits *5.5*

URL *http://eclass.uowm.gr/courses/MECH219/*

Hours per week *5*

Instructor: *N. Fachantidis*

Prerequisites: *Mathematical Analysis Physics, Introduction to Computing, Electrotechnics .*

Course content*: Introduction to Automatic Control Systems. Mathematical preliminaries:. Laplace transform and Transfer Functions. State variable models. Closed-loop response. Stability Analysis Ruth-Hurwitz. Root locus method. Methods of Systems Analysis in Frequency domain. Frequency Stability domain. Design closed-loop system with root locus, Bode diagrams, advance, lag, three term control: proportional - integral - derivative, PID.*

Expected learning outcomes and competences to be acquired: *To introduce the student to basic knowledge of theory (analysis and design) of Automatic Control Systems using appropriate software tools.*

Teaching: *Lectures and tutorials*

Assessment: *70% written exam, 30% midterm*

224 Strategic Management	Sm.	C.H.	ECTS
	8	*4*	*4.5*

Course title *Strategic management*

Course code *224*

Course type *Elective course*

Course level *Undergraduate*

Year of studies *4*

Semester *8*

ECTS Credits *4.5*

URL

Hours per week *4*

Instructor(s)

Course content The nature of strategic management – corporate vision – The external business environment – The internal business environment – Designing a strategic plan – Strategic management in practice – Application, evaluation and control of strategies – Analysis of case studies

Expected

learning outcomes and competences to be acquired: After completion of the course the student should be able to:

- *Understand the basic principles of corporate strategic management*
- *Analyze the contribution of individual aspects to the development of a strategic management plan*
- *Design a simple strategic management plan,*
- *Develop basic steps for its implementation*
- *Evaluate its effectiveness*

Prerequisites

Teaching methods Instruction of theory/ Discussion/ Case studies/Simulations/Action learning (mini- internships with organizations analyzing or redesigning practices)

Assessment methods : Project work plan 10%, Intermediate report 20%, Final report 70%

Language of instruction Greek

Recommended bibliography J. David Hunger and Thomas L. Wheelen 2007. Essential of Strategic management

228 Computational Mechanics I	Sm.	C.H.	ECTS
	7	4	4.5

Course title *Computational Mechanics I*

Course code *228*

Course type *Elective*

Course level *Undergraduate (first cycle)*

Year of studies *4*

Semester *7*

ECTS Credits *4.5*

URL *http://eclass.uowm.gr/courses/MECH186/*

Hours per week *4*

Instructor(s) *Eustathios Kikkinides*

Course content Introduction. The conservation laws and their mathematical foundation and description using Partial Differential Equations (PDE's). Non-dimensionalization and boundary condtions. Boundary value problems solution procedure. Finite difference methods. Physical domain discretization. Simple and complex expressions. Higher order approximations. Finite difference methods for parabolic PDE's. Model equation case. Explicit and implicit methods. Application: Numerical solution of the transient diffusion (or conduction) equation. Finite difference methods for elliptic PDE's. Model equation case. Solution using direct and iterative processes. Successive Over Relaxation (SOR) methods. The Alternate Direction Implicit (ADI) method. Application: Numerical solution of Laplace's or Poisson's equation. Finite difference methods for hyperbolic PDE's. Model equation case. Up-winding and the problem of artificial *dispersion/viscosity. Lax and Lax-Wendroff methods. Mc Cormack's method. Application: Wave propagation in one-dimension. Non-linear problems. Application: Solution of Burger's equation. Introduction in the solution of the Navier Stokes equations.*

Expected

learning outcomes and competences to be acquired   Aim of this course is to make the student become familiar with the basic concepts of computational techniques and the acquisition of the necessary knowhow to solve engineering problems requiring the solution of differential conservation laws in the fluid or solid state. Several techniques will be examined and evaluated in terms of accuracy, stability and consistency.

Prerequisites   Mathematics II, Numerical Analysis, Fluid Mechanics I, Heat transfer

Teaching methods   Hours of Instruction 52 (Theory: 32, Laboratories: 20)

Assessment methods: Final written exam (40% of the final grade) , three term papers (60% of the final grade) and one optional term paper for bonus.

Language of instruction   Greek

Recommended bibliography   1)   Pozrikidis C. Numerical methods in Science and Engineering 6th ed. McGraw Hill (transl. in Greek).

2)   Bergeles G., Computational fluid mechanics (in Greek)

3)   Complementary notes by the instructor.

230 Quality Control	Sm.	C.H.	ECTS
	7	4	4.5

Course title   Quality Control

Course code   230

Course type   Elective Course

Course level   Undergraduate (first cycle)

Year of studies   4

Semester   7

ECTS Credits   4.5

URL   http://eclass.uowm.gr/courses/MECH167/

Hours per week   4

Instructor(s)   George Nenes

Course content   Introduction: brief history of quality methodology, quality management, quality costs, methods for quality improvement. Acceptance sampling: lot-by-lot acceptance sampling for attributes, single, double and multiple sampling plans, statistical and economic design. Statistical Process Control: capability analysis, control charts for attributes and variables, statistical and economic design. Planning, organizing and developing quality systems for industry.

Expected learning outcomes and competences to be acquired: The course presents systematically the modern methods of quality assurance placing special emphasis on the techniques of Statistical Quality Control (SQC). After the completion of the course the students should be able to handle and solve problems related to control and assurance of quality of products and processes by means of scientifically rigorous quantitative methods.

Prerequisites   Statistics

Teaching methods   Hours of Instruction 52 (Theory: 26, Exercises: 26)

Assessment methods: Final written exam (compulsory) , Intermediate written exam (optional)

Language of instruction   Greek

Recommended bibliography   [1] Statistical Quality Control, G. N. Tagaras. Zitis Publ., 2001.

[2] Management and Statistical Quality Control, Ch. Kitsos, Newtech Publ., 2003

232 Machine elements III	Sm.	C.H.	ECTS
	7	5	4.5

Course title   Machine elements III

Course code   232

Course type   Elective Course

Course level   Undergraduate (first cycle)

Year of studies 4

Semester 7

ECTS Credits 4.5

URL

Hours per week 5

Instructor(s)

Course content Power transmission. Flat, synchronous and V-belts. Design of machine parts produced by die casting. Planetary gear trains. Nonparallel coplanar and non-coplanar gears. Worms and wormgears. Gearboxes. Design of power transmission systems.

Expected learning outcomes and competences to be acquired: Presentation, understanding and applying the principles and rules-Design of mechanical design through the analysis of specific machine elements with the aim of composition engineering.

Prerequisites Statics, Strength of Materials, Mechanical Drawing, Machine Elements I & II

Teaching methods Hours of Instruction 65 (Theory: 39, Exercises: 26) and 3 semester exercises (optional)

Assessment methods: Final written exam 70% and 30% exercises

Language of instruction Greek

Recommended bibliography [1] Machine Elements, Graikousis R., 2nd volume, Giapoulis S. & SIA O.E. Publ., 2013.

235 Manufacturing processes

	Sm.	C.H.	ECTS
	8	5	4.5

Course title Manufacturing processes

Course code 235

Course type Elective Course

Course level Undergraduate (first cycle)

Year of studies 4

Semester 8

ECTS Credits 4.5

URL

Hours per week 5

Instructor(s)

Course content Manufacturing technology with material removal. Mechanic of the cutting processes. Tool wear and life time of uncoated and coated tools. Optimization of cutting conditions. Determination of cutting force components. Cutting tools, material of cutting tools. Grinding, grinding kinematics and tools. Grinding Technologies. Gear manufacturing processes, gear hobbing, shaping, shaving grinding, lapping. Measurement of gear accuracy. Non-conventional methods for metal removal, Electroerosion. Laser applications in cutting.

Expected learning outcomes and competences to be acquired: Student's familiarity with various methods and technologies for product manufacturing processes.

Prerequisites Science and Technology of Materials I & II, Fundamentals of machining

Teaching methods Lectures

Assessment methods Final written exam

Language of instruction Greek

Recommended bibliography [1] Manufacturing processes with material removal, Bouzakis K.-D., Ziti Publ., 2010.

240 Electromechanical Applications

	Sm.	C.H.	ECTS
	8	4	4.5

Course title *Electromechanical Applications*

Course code *240*

Course type *Elective*

Course level *Undergraduate (second cycle)*

Year of studies *4*

Semester *8*

ECTS Credits *4*

URL *http://eclass.uowm.gr/courses/MECH171/*

Hours per week *4*

Instructor(s) *Theodoros Theodoulidis*

Course content *Syllabus: Electromechanical installations: electrical installations of buildings. Electromechanical applications: nondestructive testing of materials and structures. Electric generators and transformers. Power systems. Power systems.*

Expected learning outcomes and competences to be acquired *Introduction to the studies of electromechanical installations and study of applications where a synthesis of knowledge and tools of Electrical and Mechanical Engineer are required. Based on the laboratory exercises, the student acquires knowledge and capabilities in performing real Non Destructive Inspections by using at least three methods.*

Prerequisites *Electrotechnics*

Teaching methods *Hours of Instruction 52 (Theory: 39, Laboratory: 13)*

Assessment methods *One electric installation study (compulsory) , Laboratory assignments (compulsory)*

Language of instruction *Greek*

Recommended bibliography *[1] Electric installations of buildings, S. Touloglou, ION Editions, 2004.*

[2] Electric installations of consumers, P. Ntokopoulos, Zisis Editions, 2005.

246 Inventory and Supply Chain Management	Sm.	C.H.	ECTS
	8	4	4.5

Course title *Inventory and Supply Chain Management*
Course code *246*
Course type *Elective course*
Course level *Undergraduate (first cycle)*
Year of studies *4*
Semester *8*
ECTS Credits *4,5*
URL *http://eclass.uowm.gr/courses/MECH169/*
Hours per week *4*
Instructor(s) *George Nenes*
Course content *Introduction: The significant role of Inventory management and Logistics. Introduction to Supply Chain Management. Forecasting Methods. Deterministic systems of inventory management: (a) the case of known and constant demand (EOQ methods) and (b) the case of known and inconstant. Stochastic systems of inventory management: sQ, RS, sS, RsS systems. Seasonable and innovative products (Newsvendor problem). Supply Chain Management and multi-echelon inventory optimization.*
Expected learning outcomes and competences to be acquired *Understanding of the terms Logistics and Supply Chain Management. Learning quantitative inventory management methods for the case of deterministic and stochastic demand. Solving numerical examples and problems with the application of the introduced quantitative methods. Development of critical skill to choose and apply the appropriate quantitative method depending on the case under study.*
Prerequisites *Statistics*
Teaching methods *Hours of Instruction 52 (Theory: 26, Exercises: 26)*
Assessment methods: Final written exam (compulsory) , Intermediate written exam (optional)
Language of instruction *Greek*
Recommended bibliography *[1] Logistics: A quantitative approach, Vidalis M, Kleidarithmos Publ., Athens 2009.*
[2] Production Planning, Pappis K, Stamoulis Publ., Athens 2006.
[3] Design and optimization of Supply Chain Management, Marinakis I, Mygdalas A, Sofia Publ., Thessaloniki 2008.
[4] Inventory Management and Production Planning and Scheduling, Silver EA, Pyke DF, Peterson R, John Wiley and Sons 3rd ed., New York 1998.

249 Fluid Mechanics II	Sm.	C.H.	ECTS
	8	4	5.5

Course title Fluid Mechanics II

Course code 249

Course type Compulsory (or Elective)

Course level Undergraduate (first cycle)

Year of studies 4

Semester 8

ECTS Credits 5.5 (or 4.5)

URL http://eclass.uowm.gr/courses/MECH137/

Hours per week 4

Instructor(s) E. Konstantinidis

Course content Review of basic principles of fluid mechanics.

Mathematical description of isothermal flow, continuity and Navier-Stokes equations.

Boundary layer theory and practice, flow parallel to a flat plate, velocity profile, Pandtl's analysis, Blaussius solution, momentum-integral analysis, skin friction, turbulent boundary layers, law of the wall, effect of surface roughness, boundary layers in flows with pressure gradients, flow separation.

External flow over submerged bodies, drag coefficient, aero/hydrodynamic forces on submerged bodies, effect of Reynolds number, unsteady phenomena, flow over a circular cylinder, vortex shedding, Strouhal number, vortex-induced vibrations, vehicle aerodynamics, flow past airfoils, lift, drag-lift curve, dynamic stall.

Transition to turbulence, types of transition, linear stability analysis, Orr-Somerfield equation, shear layers and wakes.

Turbulent flows, statistical description of turbulence, integral scales, inertial subrange, Kolmogorov theory, energy dissipation, turbulence modelling, eddy viscosity, Reynolds-Averaged Navier-Stokes equations, large-eddy simulation, direct numerical simulation.

Compressible flow, speed of sound, Mach number, unidirectional adiabatic and isentropic flow, normal shock waves, Fanno and Raileigh flow. Two-dimensional compressible flows, oblique shock waves.

Expected learning outcomes and competences to be acquired: The course aims to the comprehensive treatment of Fluid Mechanics principles and their application to the study of engineering flows. The phenomenology and the mathematical description of a variety of flows is covered with a view to develop the understanding and skills required for the solution of practical problems.

Prerequisites Fluid Mechanics I, Thermodynamics I

Teaching methods lectures and tutorials

Assessment methods 25% homework (x3), 75% final written exam

Language of instruction Greek

Recommended bibliography [1] Goulas A., Fluid Mechanics, Giaxoudi, 2005 (in greek)

[2] Tsangaris S., Fluid Mechanics, Symeon, 2005 (in greek)

[3] White F.M., Fluid mechanics, 5th edn., McGraw-Hill, 2003.

250 Experimental methods and Measurement technology	Sm.	C.H.	ECTS
	7	4	4.5

Course title Measurement Science and Technology

Course code 250

Course type Elective

Course level Undergraduate (first cycle)

Year of studies 4

Semester 7

ECTS Credits 4.5

URL http://eclass.uowm.gr/courses/MECH156/

Hours per week 4

Instructor(s) E. Konstantinidis

Course content Measurement science: mathematical description of measurement systems, input-output signal characteristics, transfer function, measurement standards, static and dynamic calibration, bias and random errors, statistical analysis of data, measurement uncertainty and error propagation, analogue and digital signal processing.

Measurement techniques for temperature, static and dynamic pressure, local flow velocity, flowrate, strain, displacement, force and torque.

Expected learning outcomes and competences to be acquired: This course introduces the student to the basic principles of measurement techniques in mechanics. The students become familiarized with the design of experimental plans, the operation of measurement instruments, and the analysis of data through laboratory exercises.
Prerequisites Fluid Mechanics I, Heat Transfer, Statistics
Teaching methods lectures, tutorials and laboratory exercises
Assessment methods 30% laboratory reports, 70% final written exam
Language of instruction Greek
Recommended bibliography [1] Bergeles, Papantonis, Tsangaris, Measurement Techniques for Fluid Flow, Symeon, 1998
[2] Goulas, A. Measurement Techniques in Fluid Mechanics, Giaxoudi, 1988
[3] Tavoularis, S., Measurement in Fluid Mechanics, Cambridge, 2005

251 Energy design of buildings I	Sm.	C.H.	ECTS
	8	4	4.5

Course title Energy Design of Buildings I
Course code 251
Course type Elective Course
Course level Undergraduate
Year of studies 4
Semester 8
ECTS Credits 4.5
URL http://eclass.uowm.gr/courses/MECH206/
Hours per week 4
Instructor(s) Manolis Souliotis
Course content Conditions of Thermal Comfort. Energy and Thermal Balance of Buildings. Natural Lighting of Buildings. Passive and Hybrid Solar Systems for Heating in Buildings. Design and Incorporation of Passive Solar Systems in Buildings. Calculation Methods of Passive Solar Energy Systems. Energy Certification of Buildings. Energy Identity of Buildings.
Expected learning outcomes and competences to be acquired: The course presents systematically basic knowledge of Design of low Energy Buildings. After the completion of the course the students should be able to calculate the energy needs in Buildings in regard to the conditions of thermal comfort and new energy identity rules.
Prerequisites
Teaching methods Hours of Instruction 52
Assessment methods Final written exam (compulsory), Small project at home (optional)
Language of instruction Greek
Recommended bibliography [1] ΕΝΕΡΓΕΙΑ ΣΤΗΝ ΑΡΧΙΤΕΚΤΟΝΙΚΗ, ΤΣΙΓΚΑΣ ΕΡΩΤΟΚΡΙΤΟΣ.

252 Computer Aided Manufacturing for Industrial Production	Sm.	C.H.	ECTS
	8	4	4.5

Course title Computer Aided Manufacturing for Industrial Production
Course code -
Course type Elective course
Course level Undergraduate (second cycle)
Year of studies 4
Semester 8
ECTS Credits 4.5
URL http://eclass.uowm.gr/courses/MECH252/
Hours per week 4

Instructor:
Prerequisites: Fundamentals of Machining
Course content*:* Introduction to computer aided industrial manufacturing, automatic control and guidance, computerized numerical control (CNC) metalworking machine tools, Programming and Simulation of CAM systems.
Expected learning outcomes and competences to be acquired : *Operating principles and introduction to digitally control and programmable machinery*. Application in laboratory student produced machined samples.

Teaching: Lectures and practical tutorials

Assessment: 70& written exam, 30% either mid-term exam or homework

253 Multivariate Statistics	Sm.	C.H.	ECTS
	8	4	4.5

Course title Multivariate Statistics

Course code -

Course type Elective course

Course level Undergraduate (second cycle)

Year of studies 4

Semester 8

ECTS Credits 4.5

URL http://eclass.uowm.gr/courses/MECH205/

Hours per week 4

Instructor(s) Sofia Panagiotidou

Course content Two-dimensional random variables: joint, marginal and conditional distributions. Covariance and correlation. Independent random variables, sums of random variables. The bivariate normal distribution. Analysis of variance: the fixed and random effects models for one factor. Design of statistical experiments: factorial and fractional factorial experiments, design and statistical analysis. Simple and multiple linear and nonlinear regression analysis. Correlation.

Expected learning outcomes and competences to be acquired : After the completion of the course the students should be able to implement the theory fundamentals and apply the statistical analysis methods in problems where more than one random variables are involved.

Prerequisites Statistics

Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26)

Assessment methods: Final written exam (compulsory), Intermediate written exam and/or assignments (optional)

Language of instruction Greek

Recommended bibliography [1] Probability and Statistics for Engineers, G. Ch. Zioutas, Zitis Publ., 2013.

[2] Statistics for Economics and Business Administration, G. Keller, Epikentro Publ., 2010.

309 Pumps, compressors and mass transport in closed conduits	Sm.	C.H.	ECTS
	10	4	4

Course title Pumping and Compression Stations

Course code 309

Course type Elective

Course level Undergraduate (first cycle)

Year of studies 5

Semester 10

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH138/

Hours per week 4

Instructor(s) E. Konstantinidis

Course content Review of fluid flow trough closed pipes, head loss, friction factor, minor losses, hydraulic and energy grade lines, empirical relationships, non-cicrcular tubes, hydraulic diameter.

Pipelines: material, thickness, optimum diameter, flow control, definition and properties of valves, hydraulic characteristics of valves, selection of valves .

Pipe networks: layout, nodes and branches, mathematical description of pipe systems, solution of the system of equations, linearization of equations, Hardy-Cross method, dedicated software.

Pumps: types, positive-displacement and dynamic pumps, characteristics, selection.

Centrifugal pumps: dimensional analysis, characteristic curves, hydraulic power, efficiency, affinity laws, specific speed, cavitation, Net Positive Suction Head.

Pumping stations: design and operation point, operation, control and automation, layout, configuration of suction.

Fluid transients: rigid-column theory, water hammer, pressure surges, Bergeron method, Parmakian method, numerical solution of equations, method of characteristics, surge protection and control devices, surge tanks, design of air chambers. Transport of gases: basic equation for gas flow, compressibility factor, empirical equations (Panhandle, AGA, Crane), simple models, isothermal flow, analytical computer models, power requirements, compressors, types of, multistage compressors, reduction of compression work.

Expected learning outcomes and competences to be acquired : The course aims at learning the technologies of mass transport in closed conduits under pressure, understanding the basic principles of their design and operation, and developing appropriate methodologies for the treatment of engineering problems

Prerequisites Fluid Mechanics I, Turbomachinery

Teaching methods lectures and tutorials

Assessment methods 20% coursework (pump selection and network analysis study), 30% design project, 50% final exam

Language of instruction Greek

Recommended bibliography [1] Papantonis D., Hydrodynamic Facilities, Symeon, 1998 (in greek)
[2] Papantonis D., Hydrodynamic Machines, 2nd ed., Symeon, 2002 (in greek)

316 Solar Technique / Photovoltaic Systems	Sm.	C.H.	ECTS
	9	4	4

Course title Solar Technique - Photovoltaic Systems
Course code 316
Course type Elective Course
Course level Undergraduate
Year of studies 4
Semester 9
ECTS Credits 4
URL http://eclass.uowm.gr/courses/MECH197/
Hours per week 4
Instructor(s) Manolis Souliotis

Course content Solar Radiation. Parameters and Calculation of the Incoming Solar Radiation on horizontal and Inclined Surface. Calculation of the Energy Needs in Space Heating and Domestic Water Heating. Flat Plate Solar Thermal Collectors. Concentrating Solar Thermal Collectors. Storage of Solar Energy in Heating Processes. Integrated Solar Energy Systems for Heating Processes. F-Chart Method. Technology of the Photovoltaics. Photovoltaic Panels. Photovoltaic Systems. Dimension Process in Photovoltaic Systems.

Expected learning outcomes and competences to be acquired : The course deals with the basic principles of the exploitation of Solar Energy. After the completion of the course the students should be able to design solar systems for the coverage of thermal and electrical needs in buildings.

Prerequisites

Teaching methods Hours of Instruction 52

Assessment methods: Final written exam (compulsory), Small project at home (optional)

Language of instruction Greek

Recommended bibliography [1] Ήπιες Μορφές ενέργειας ΙΙ - Ηλιακή Μηχανική, Καπλάνης Σωκράτης.
[2] Φωτοβολταϊκή Τεχνολογία, Καγκαράκης Κωνσταντίνος.

318 Wind and water turbines, hydroelectric plants	Sm.	C.H.	ECTS
	9	4	4

Course title Wind and Water Turbines – Hydroelectric Plants
Course code 318
Course type Elective
Course level Undergraduate (first cycle)
Year of studies 5
Semester 9
ECTS Credits 4
URL http://eclass.uowm.gr/courses/MECH159/
Hours per week 4 (2 hours of Theory Lectures, 2 hours of exercises and tutorials)
Instructor(s) Assoc. Professor Antonios Tourlidakis

Course content Wind turbines. Introduction to wind energy and wind turbines. Atmosphere and wind energy potential. Types of wind turbines and subsystems. Aerodynamic design of horizontal axis wind turbines. Aerodynamic design of

vertical axis wind turbines. Static and dynamic wind loading. Selection of installation site. Wind farms. Turbine components' selection. Economics of wind energy.
Water turbines and hydroelectric plants. Global and national situation, benefits and impacts. Hydroelectric plants and their classification , advantages and disadvantages, hydrodynamic potential, hydrographs. Principles of operation and classification of water turbines, impulse turbines, reaction turbines, similarity theory, specific speed, cavitation phenomena.
Expected learning outcomes and competences to be acquired : The main aim of the course is to provide the student with an introduction to the principles governing the operation of wind generators and water turbines. The student will gain an in depth knowledge and understanding of the principles of operation, of the flow phenomena and the design characteristics of these machines. He / she will also gain experience in using specific techniques for the analysis, design and selection of various classes of wind and water turbines. During the course the development and use of computational methods are encouraged, and there is also requirement for an experimental activity and a group project.
The student will be able to assess the wind potential of an area, to select the location for the installation of wind turbines and perform economic and technical evaluations. In addition, the student will be able to assess the hydrological potential of a region, select the appropriate type of turbines and assess the expected power output.
Prerequisites Fluid Mechanics I, Turbomachinery
Teaching methods Lectures, exercises, laboratory tutorials for the use of open source software. Homework and personal assignments with the application of software on real design and analysis problems. Utilization of information technology for the course management.
Assessment methods: FinalExamination, group project, assignment
Language of instruction Greek
Recommended bibliography [1] "Wind Turbines", Bergeles George H., Simeon Publications
[2] "Management of Wind Power", Second Edition, Kaldellis John K. Stamoulis

348 Combustion Phenomena	Sm.	C.H.	ECTS
	10	4	4

Course title Combustion Phenomena
Course code 348
Course type Elective Course
Course level Undergraduate
Year of studies 5
Semester 10
ECTS Credits 4
URL http://eclass.uowm.gr/courses/MECH144/
Hours per week 4
Instructor(s) Kolokotronis D.
Course content Kinetic theory of gases, transport phenomena, chemical thermodynamics. Overview of chemical kinetics: order of reaction, chain reactions, permanent condition and chemical equilibrium. Detonation limits and oxidizing characteristics of fuels (hydrogen, carbon monoxide, methane, paraffins, aromatic hydrocarbons). Premixed flames: 1-D flow, laminar flame structure, flame speed (Mallard and LeChatelier), ignition limits, quenching distance, flashback and blowoff, flame stability limits. Turbulent flows with flames, turbulent flame speed, flame stabilisation in high velocity flows, Diffusion flames: Phenomenology, 1-D flame balances, turbulent fuel jets. Ignition: chain ignition, forced thermal ignition.
Expected learning outcomes and competences to be acquired The course includes the presentation of basic phenomena related to combustion, as chemical equilibrium, chemical kinetics and mass, momentum and energy transport phenomena. The course also includes presentation of practical problems related to combustion. It is expected that at the end of the course, students familiarize with the above so they are able to study and understand combustion phenomena for various applications by means of deep study of theory and practical and theoretical exercises.
Prerequisites Thermodynamics I, Thermodynamics II, Fluid Mechanics I
Teaching methods Oral presentations and exercises
Assessment methods: Final written exam (compulsory), course project (compulsory)
Language of instruction Greek
Recommended bibliography [1] An Introduction to Combustion: Concepts and Applications, Turns S.R., McGraw Hill Education, 2011
[2] Theory of Combustion and Combustion Systems, Founti M.,N.T.U.A., 2005

349 Special topics on energy conversion technologies

	Sm.	C.H.	ECTS
	10	4	4

Course title	Special Topics on Energy Conversion Technologies
Course code	349
Course type	Elective
Course level	Undergraduate (third cycle)
Year of studies	5th
Semester	10th
ECTS Credits	4
URL	http://eclass.uowm.gr/courses/MECH173/
Hours per week	4
Instructor(s)	George Marnellos
Course content	Introduction to energy systems, Global, European and National energy balance, Fossil Fuels, Conventional power generation, Solar Energy, Wind Power, Biomass & Synthetic Fuels, Geothermal Power, Hydropower, Techno-economic evaluation, Kwh cost calculation: parameters influencing cost, maintenance, fuel and operation cost, specific heat consumption, examples
Expected learning outcomes and competences to be acquired:	This course deals with special topics on energy conversion technologies such as (a) conventional and alternative energy conversion technologies, (b) cogeneration and combined cycles (c) trends for power plants towards zero emissions and higher efficiencies (d) kWh costing.
Prerequisites	Heat Transfer, Fluid Mechanics, Thermodynamics, Steam Generators I & II
Teaching methods	Hours of Instruction 52 (Theory: 26 h, Exercises: 26 h)
Assessment methods: Final written exam (compulsory) , Midterm written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Personal notes (in Greek and English version)
[2] “Alternative Energy Forms”, V. Bitzionis
[3] “Biofuels – Sustainable Energy”, N. Karnavos, A. Lappas and G. Marnellos

350 Special topics on pollution control technologies

	Sm.	C.H.	ECTS
	10	4	4

Course title	Special Topics on Pollution Control Technologies
Course code	350
Course type	Elective
Course level	Undergraduate (third cycle)
Year of studies	5th
Semester	9th
ECTS Credits	4
URL	http://eclass.uowm.gr/courses/MECH131/
Hours per week	4
Instructor(s)	George Marnellos
Course content	Wastewater treatment, Wastewater charecteristics, Sewage sludge treatment, Solid waste management, Recycling, Combustion, Thermochemical and biological processes, Pollution control technologies in Otto engines, Three-way catalytic converters, λ sensors, Pollution control technologies in Diesel engines, Soot formation, Soot traps, Pollution control technologies in airplanes, Hybrid cars, Fuel cell cars.
Expected learning outcomes and competences to be acquired	: The course will refer to special issues in control pollution technologies related to wastewater treatment and solid waste management as well as their potential exploitation for power generation. The course also focuses on pollution control technologies employed in the case of mobile sources and on alternative means of transport (e.g., hybrid and hydrogen cars).
Prerequisites	Chemistry, Environmental Technology
Teaching methods	Hours of Instruction 52 (Theory: 26 h, Exercises: 26 h)
Assessment methods: Final written exam (compulsory) , Midterm written exam (optional)
Language of instruction	Greek
Recommended bibliography	[1] Personal Notes
[2] “Waste Water Treatment Technologies”, Metcalf & Eddy
[3] “Air Pollution Control”, D. Cooper and C. Alley
[4] “Air Pollution. Effects, Control and Alternative Technologies”, I. Yentekakis

[5] “Quality Control and Treatment of Water”, M. Mitrakas

352 Techno-economic assessment	Sm.	C.H.	ECTS
	9	5	4

Course title Engineering and feasibility study
Course code 352
Course type Elective course
Course level Undergraduate (third cycle)
Year of studies 5
Semester 9
ECTS Credits 4.0
URL http://eclass.uowm.gr/courses/MECH163/
Hours per week 4
Instructor(s) George SKODRAS
Course content Principles and methodology of financial analysis of industrial plants. Design and optimization methodology. Evaluation indices. Engineering and financial evaluation of investment plans. Design and time scheduling. Methodology of feasibility studies and financial analysis of investments.
Expected learning outcomes and competences to be acquired: The course presents systematically the design and optimization of industrial plants, as well as the preparation of feasibility studies. After the completion the students will be able to approach effectively the issues of the financial and engineering evaluation of industrial plants and to handle design and optimization problems, by means of scientifically rigorous quantitative methods.
Prerequisites Thermodynamics, Mathematics, Statistics, Steam generators, Engineering and energy legislation
Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26) & Three home works (3)
Assessment methods : Final written exam (compulsory), three home works (compulsory)
Language of instruction Greek
Recommended bibliography [1] Σχεδιασμός και οικονομική ανάλυση εγκαταστάσεων για μηχανικούς, 3rd edition, McGraw Hill, M. Peters, K. Timmerhaus, R. West

356 Technology, Research, Innovation Policies and Entrepreneurship	Sm.	C.H.	ECTS
	9	5	4

Course title Technology, Research, Innovation Policies and Entrepreneurship
Course code 356
Course type Elective Course
Course level Undergraduate (first cycle)
Year of studies 5
Semester 9
ECTS Credits 4
URL http://elearn.materlab.eu/course/view.php?id=8
Hours per week 5
Instructor(s) Yiannis Bakouros
Course content National Policies of research and technological growth –National policies of innovation –European map of research and technological growth –Models of policies of research and growth –Models of policies of innovation –Analysis of case studies. Study and Development of Business Plan.
Expected learning outcomes and competences to be acquired Aim of course is το make students understand the significances of policies of Innovation, Research and Technological Growth. Emphasis is given in the policies in regional, national and European level. Examples- case studies from pilot regions and National Innovation Systems are studied.
Prerequisites
Teaching methods Lectures (13 wks x 4 hrs theory) and two obligatory homework projects.
Assessment methods 30% final oral exam, 70% two homework projects
Language of instruction Greek
Recommended bibliography Book, E. Carayiannis, Y.L Bakouros, “Innovation and Entrepreneurship: Theoty and Practice”, 2010

367 Simulation and System Dynamics	Sm.	C.H.	ECTS

10 4 4

Course title Simulation and System Dynamics
Course code 367
Course type Elective Course
Course level Undergraduate (first cycle)
Year of studies 5
Semester 10
ECTS Credits 4
URL http://eclass.uowm.gr/courses/MECH168/
Hours per week 4
Instructor(s) George Nenes
Course content Design, analysis and development of simulation, random numbers, random numbers generators and simulation sampling, statistical analysis of simulation results. Applications in industrial management and operations research. Practice on specialized simulation software. Fundamental system concepts, the object of a system dynamics analysis.
Expected
learning outcomes and competences to be acquired: Knowledge of the terminology of discrete event simulation and continuous simulation. Ability to analyze a physical system and to develop a simulation model. Simulation model transformation using simulation environments (programming languages). Ability of statistical analysis and explanation of simulation results.
Prerequisites Statistics
Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26)
Assessment methods 4 Intermediate Written Assignments (compulsory)
Language of instruction Greek
Recommended bibliography [1] Simulation Techniques Theory & Applications, Roumeliotis, M., Souravlas, I.S., Tziola Publ., Thessaloniki 2012.
[2] Theory of System Dynamics, Georgiadis, P., Sofia Publ., Thessaloniki 2006.
[3] Simulation and Applications, Sfakianakis, M., Patakis Publ., Athens 2001.
[4] Spreadsheet modeling and decision analysis, Ragsdale, C., South-Western Educational Publishing (3rd edition), 2000.

371 Vehicle Design Methods	Sm.	C.H.	ECTS
	9	4	4

Course title *Vehicle Design Methods*
Course code *371*
Course type *Elective*
Course level *Undergraduate*
Year of studies *5*
Semester *9*
ECTS Credits *4*
URL *http://eclass.uowm.gr/courses/MECH143*
Hours per week *4*
Instructor(s) *-*
Course content *Introduction, Wheels and tires, Resistance movement, Circle drive, Energy analysis, Vehicle Engine and performance, Fuel consumption, Driving limits, Brakes, Suspension*
Expected learning outcomes and competences to be acquired: *Understanding of the basic principles of operation of individual systems of the modern vehicles. Calculation of basic components of the vehicle. Understanding the steps and methods of design of modern vehicles.*
Prerequisites *-*
Teaching methods *Lectures (13 weeks x 2 hour of Theory and 2 hours of Exercises) and homeworks.*
Assessment methods *25% oral exam, 75% homework*
Language of instruction *Greek*
Recommended bibliography *-*

372 Numerical methods in design of mechanical structures	Sm.	C.H.	ECTS
	7	5	4.5

Course title Numerical methods in design of mechanical structures
Course code 372
Course type Elective
Course level Undergraduate
Year of studies 4
Semester 7
ECTS Credits 4.5
URL http://eclass.uowm.gr/courses/MECH128
Hours per week 5
Instructor(s) Dimitrios Giagopoulos
Course content Introduction to FEM, The Total Potential Energy of System. Matrix Algebra, Spring, Bar and Beam elements. Stiffness and Mass matrices, Plane trusses Two dimensional problems (membranes, disks, plates, shells)., Stress and strain relations, Strain and displacement relations, the equilibrium Equations. Equations solving, direct and iterative methods. Linear Static analysis, Structural vibration and dynamics, Basic equations, modal equations, damping, transient response analysis. 3D problems. The course, beyond the theoretical teaching, introduces the student and into programming, based on application programs in an environment of MATLAB, and commercial finite element computer software.
Expected learning outcomes and competences to be acquired : Understanding the mathematical background of the Finite Element Method (FEM) and use the method to solve structural dynamics problems. The engineering problem involves a structure subjected to certain loads. The idealization of the problem to a mathematical model requires certain assumptions that together lead to differential equations governing the mathematical model. The finite element analysis FEA solves these differential equations. The Numerical methods in design of mechanical structures is particularly important in cases of real applications, because of the complexity and size of the calculations, of the conventional mathematical methods
Prerequisites Mechanical Vibrations and Machine Dynamics, Statics, Mechanics of Materials.
Teaching methods Lectures (13 weeks x 2 hour of Theory and 2 hours of Exercises) and homeworks.
Assessment methods 25% final exam, 75% homework
Language of instruction Greek
Recommended bibliography [1] Introduction to Finite Elements in Engineering, Chandrupatla-Tirupathi- Belegundu, Klidarithmos Publ.(in Greek), 2006.
[2] Finite Element Method , P. Gotsis, Zitis Publ.(in Greek), 2008.

376 Technical and Energy Legislature	Sm.	C.H.	ECTS
	9	3	4

Course title Engineering and energy legislation

Course code 376

Course type Elective course

Course level Undergraduate (third cycle)

Year of studies 5

Semester 9

ECTS Credits 3.0

URL http://eclass.uowm.gr/courses/MECH120/Hours per week 3

Instructor(s) George SKODRAS

Course content General principles of law. The basic legal concepts are discussed and explained. The various branches of law are presented and briefly analyzed. The “Technical & Energy legislation” includes the subjects of “Construction works”, “Environmental legislation”, “Energy legislation”, “Energy market deregulation”, “Health and safety legislation”.

Expected learning outcomes and competences to be acquired The course presents systematically the engineering and energy legislation issues. It provides fundamental information in the context of the EU and Greek legislation with respect to energy, environment, construction works, health and safety and energy market liberalization. After the completion the students will be able to approach effectively the issues of licensing industrial plants and energy markets as well, and to handle establishment and operation of construction works, energy generation, distribution and services, by means of scientifically rigorous methods.

Prerequisites

Teaching methods Hours of Instruction 39 (Theory: 27, Exercises: 12) & Three home works (3)

Assessment methods Final written exam (compulsory), three home works (compulsory)

Language of instruction Greek

Recommended bibliography

[1] Δίκαιο της ενέργειας, Θ. Φορτσάκης, Wolters Kluwer – Ant. N. Sakkoulas

[2] Συλλογή νομοθεσίας για τις Ανανεώσιμες Πηγές Ενέργειας (ΑΠΕ), Κ.Π. Βατάλης, Εκδόσεις Σάκκουλα

[3] Συλλογή νομοθεσίας για τις Ανανεώσιμες Πηγές Ενέργειας (ΑΠΕ), Συμπλήρωμα, Κ.Π. Βατάλης, Εκδόσεις Σάκκουλα

[4] Κώδικας Διαχείρισης του Συστήματος & Συναλλαγών Ηλεκτρικής Ενέργειας, Εκδόσεις Σάκκουλα

[5] Εισαγωγή στο δίκαιο ηλεκτροπαραγωγής από Ανανεώσιμες Πηγές Ενέργειας, Κ.Π. Βατάλης, Εκδόσεις Σάκκουλα

[6] Η περιβαλλοντική αδειοδότηση έργων σε περιοχές του δικτύου Natura 2000, Κ. Γώγος, Εκδόσεις Σάκκουλα

[7] Κώδικας δημοσίων έργων – Νομοθεσία και Νομολογία κατ’ άρθρο, Β.Ε. Κωτσοβίνος

[8] Δημόσια Έργα – Κωδικοποιημένη Νομοθεσία Δημοσίων Έργων και Μελετών-Ερμηνεία-Νομολογία, Δ. Σολδάτος, Εκδόσεις Μ. Δημοπούλου

[9] Κωδικοποίηση Νομοθεσίας Δημοσίων Έργων, Ζ. Χατζηχαλκιάς, Εκδόσεις Ιων

[10] Ασφαλιστικά και Εργασιακά Θέματα, Εργατοϋπαλληλικό Κέντρο Θεσσαλονίκης

[11] Βασικές διατάξεις προστασίας του περιβάλλοντος, Α.Ι. Τάχος, Εκδόσεις Σάκκουλα

[12] Δίκαιο του περιβάλλοντος, Ε. Κουτούπα-Ρεγκάκου

377 Operations Research II	Sm.	C.H.	ECTS
	9	3	4

Course title Operations Research II

Course code 377

Course type Elective course

Course level Undergraduate (third cycle)

Year of studies 5

Semester 9

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH204/

Hours per week 4

Instructor(s) Sofia Panagiotidou

Course content Stochastic processes and discrete-time Markov chains: classification of states, long-run properties. Markovian processes with rewards, control and optimization. Applications in inventory control and maintenance management. Continuous-time Markov chains, birth-and-death processes. Queuing theory: classification of queuing systems and examples of queuing phenomena. Queuing models with a single or multiple servers, finite or infinite queue, finite or infinite population. Priority in queues service. Linear and nonlinear queuing networks. Optimization of queuing systems and networks.

Expected learning outcomes and competences to be acquired: After the completion of the course the students should be able to understand the theory fundamentals and apply the stochastic methods of operations research. More specifically, the main objective is the understanding of the basic concepts of stochastic processes, Markov chains and queuing theory and the ability to apply them for solving relevant problems.

Prerequisites Statistics

Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26)

Assessment methods: Final written exam (compulsory), Intermediate written exam and/or assignments (optional)

Language of instruction Greek

Recommended bibliography [1] Stochastic Methods in Operations Research, P-Ch. G. Vasileiou. Zitis Publ., 1999.

[2] Introduction to Stochastic Processes, O. Chrysafinou, Sofia Publ., 2012.

379 Applications of Materials for Energy and Environmental Technologies	Sm.	C.H.	ECTS
	10	4	4

Course title Applications of Materials for Energy and Environmental Technologies

Course code 379

Course type Elective Course

Course level Undergraduate

Year of studies 5

Semester 10

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH207/

Hours per week 4

Instructor(s) Manolis Souliotis

Course content The course deals with the description and analysis of metallic and ceramic materials for energy and environmental technologies. The studied materials can be used in alternative technologies for the improvement of energy efficiency in systems (used materials in: batteries, hydrogen technologies, elecrtrochromic devices, phase change, piezoelectric devices, magnetic-thermal devices) and also in environmental technologies (several kinds of filters, fuel cells, sensors, etc).

Expected learning outcomes and competences to be acquired After the completion of the course the students should be able to comprehend in the connection of materials and their properties with the energy and environmental technologies.

Prerequisites Technology of Materials I & Technology of Materials II

Teaching methods Hours of Instruction 52

Assessment methods Final written exam (compulsory), Small project at home (optional)

Language of instruction Greek

Recommended bibliography [1]. Επιστήμη και Τεχνολογία Υλικών, Βατάλης Αργύρης Σ.

380 Computer-Aided Design	Sm.	C.H.	ECTS
	9	4	4

Course title Computer-Aided Design

Course code 380

Course type Elective

Course level Undergraduate

Year of studies 5

Semester 9

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH117

Hours per week 4

Instructor(s) Nickolas S. Sapidis

Course content Introduction to Computer-Aided Design and to CAD/CAE/CAM Systems. Coordinate systems and geometric transformations. Basic principles of CAD and related mathematical & information models. Elements of three-dimensional (3D) Computer Graphics. Mathematical models, data structures and algorithms for geometric modeling of curves, surfaces and 3D solids. Representation and processing/management of mechanical assemblies. Mechanical Computer-Aided Design. Laboratory exercises using a CAD system.

Expected learning outcomes and competences to be acquired : Understanding and ability to apply basic geometric (CAD) models for curves/surfaces/solids as well as standard geometric transformations. Ability to create and process a 3D model of a low-complexity mechanical component in a standard CAD system.

Prerequisites (recommended) Introduction to Computing, Linear Algebra, Mechanical Drawing II, Mathematics IV, Machine Elements II

Teaching methods Lectures (13 weeks x 2,5 hours of Theory and 1,5 hours of CAD Exercises)

Assessment methods Final written exam (75%) and CAD projects (25%)

Language of instruction Greek

Recommended bibliography [1] N. Bilalis & E. Maravelakis, “CAD/CAM Systems & 3D Modeling”, Kritiki Publications, 2009 (in Greek).

[2] K. Lee, “Principles of CAD/CAM/CAE Systems”, Kleidarithmos Publications, 2009 (translated into Greek).

381 Computational Mechanics II	Sm.	C.H.	ECTS
	10	4	4

Course title Computational Mechanics II

Course code 381

Course type Elective

Course level Undergraduate

Year of studies 5

Semester 10

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH381

Hours per week 4

Instructor: J.G.Bartzis

Expected learning outcomes and competences to be acquired: The course is focused on Computational Fluid Mechanics. The objective of this course is to acquire the necessary expertise in the field of the mathematical simulation of the flow mass and heat. The student will become familiar with existing computational codes developing additional knowledge on their use and evaluation. Emphasis will be given on practical engineering applications.

Prerequisite courses: Mathematical Analysis I, II, III, IV, Numerical Analysis and Simulation, Heat transfer, Fluid Mechanics, Computational Mechanics I, Introduction to computers.

Teaching: Weekly oral lectures (3 hours theory, 2 hours lab with mandatory presence), weakly mandatory home exercises, 2 mandatory homeworks, final examination.

Assessment: 50% written final examination, 50% home exercises and works.

382 Rotordynamics	Sm.	C.H.	ECTS
	10	4	4

Course title *Rotordynamics*

Course code *382*

Course type *Elective*

Course level *Undergraduate*

Year of studies *5*

Semester *10*

ECTS Credits *4*

URL *http://eclass.uowm.gr/courses/MECH114*

Hours per week *4*

Instructor(s) *Dimitrios Giagopoulos*

Course content Free vibration and forced response of single degree of freedom linear oscillators to impulsive, harmonic, periodic and transient excitation (natural frequency, damping ratio, resonance). Response of multiple degree of freedom linear oscillators (formulation of the equations of motion, determination of natural frequencies and mode shapes, modal analysis). Axial, torsional and bending vibration of bars. Applications (measurement and evaluation of vibration characteristics, vibration isolation, vibration absorption, balancing, torsional vibration). The course, beyond the theoretical teaching, introduces the student and into programming, based on application programs in an environment of MATLAB.

Expected learning outcomes and competences to be acquired :Understanding through a number of available methods the complete dynamic performance of rotors. The dynamics of rotor-bearing systems is directly related to energy machines (hydrodynamic machines, turbomachinery, generators, compressors, etc.) and other production machines, whose performance depends on the angular velocity. To achieve optimal performance of these machines requires a thorough dynamic analysis.

Prerequisites *Mechanical Vibrations and Machine Dynamics, Dynamics, Statics, Introduction to Computers*

Teaching methods Lectures (13 weeks x 2 hour of Theory and 2 hours of Exercises) and homeworks.

Assessment methods 25% final exam, 75% homework

Language of instruction Greek

Recommended bibliography [1] Vibrations of Mechanical Systems, S. Natsiavas, Zitis Publ.(in Greek), 2001.

[2] Machine dynamics , A. Kanararhos, I. Antoniadis, Papasotiriou Publ.(in Greek), 1998.

383 Energy saving technologies and Industrial Systems Optimization	Sm.	C.H.	ECTS
	10	4	4

Course title Methodologies of energy conservation and optimization of industrial plants

Course code 383

Course type Elective course

Course level Undergraduate (third cycle)

Year of studies 5

Semester 10

ECTS Credits 4.0

URL

Hours per week 4

Instructor(s) George SKODRAS

Course content Energy resources and reserves. Energy consumption and energy intensity in the Greece, the EU and the globe. The perspectives of the various energy resources. The energy conservation policy in the EU and in Greece. Global energy and exergy balances, energy and exergy efficiency indices. Combustion issues, combustion reactions, stoichiometry and efficiency. Energy losses and efficiency in combustion systems. Energy efficiency and losses in energy conversion and transportation systems. Methodologies and techniques to reduce energy losses. Objective functions and optimization of industrial plants. Financial analysis of energy conservation.

Expected learning outcomes and competences to be acquired: The course presents systematically the energy conservation methodologies and the optimization of industrial plants issues. Energy and exergy analysis of the processes, as well as alternative routes for industrial processes of lower energy consumption are discussed and analyzed. After the completion the students will be able to approach effectively the issues of energy conservation at industrial plants and to handle optimization problems, by means of scientifically rigorous quantitative methods.

Prerequisites Thermodynamics, Mathematics, Statistics, Steam generators, Engineering and feasibility studies

Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26) & Three home works (3)

Assessment methods : Final written exam (compulsory), three home works (compulsory)

Language of instruction Greek

Recommended bibliography [1] Αρχές διαχείρισης ενέργειας στη βιομηχανία, Β’ έκδοση 2003, ΕΜΠ, Β. Λυγερού, Α.Ι. Λυγερός

385 Gas Turbine Technology	Sm.	C.H.	ECTS
	9	4	4

Course title Gas Turbine Technology

Course code 385

Course type Elective Course

Course level Undergraduate (first cycle)

Year of studies 5

Semester 9

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH157/

Hours per week 4(2 hours of Theory Lectures, 2 hours of exercises and tutorials)

Instructor(s) Assoc. Professor Antonios Tourlidakis

Course content Introduction and applications of gas turbines. Open cycle configurations. Closed cycle configurations. Aircraft Propulsion. Industrial applications. Environmental issues. Power Cycles. Ideal cycles. Gas turbine component losses. Operation at the nominal operating point. Combined cycle and cogeneration schemes. Gas turbine cycles for aircraft propulsion. Simple Turbojet engine. The Turbofan engine. The Turboprop engine. The Turboshaft engine. Auxiliary power units . Axial and radial flow Compressors. Principles of operation. Work done and pressure rise. Dimensional flow. Compressor performance characteristics and design processes. Combustion systems. Types of combustion systems. The combustion process. Emissions. Coal gasification. Axial and radial flow Turbines. Basic theory. Selection of aerodynamic parameters. Blade cooling. Performance prediction of simple gas turbines. Components characteristics. Operation at off-design conditions.

Expected learning outcomes and competences to be acquired : The purpose of this course is to introduce to the students the basic operating principles, the components and the applications of gas turbine.

Upon completion of the course the student will be able to obtain state-of-the-art knowledge in the area of operation and thermodynamics of modern gas-turbine engines.

The student is expected to acquire knowledge and be able to analyze thermodynamic cycles of various types of gas turbine engines for aircraft propulsion and industrial applications. The student will be able to calculate the thrust and specific consumption of various types of aircraft engines such as turbojet, turbofan and turboprop; and, to assess the effects of speed and altitude on performance characteristics. In addition, the students will be able to select the main operating parameters of industrial gas turbines and calculate the effect of the characteristics of individual components on the overall engine performance such as the power output and the specific consumption. The student will be able to use specialised software for the preliminary design and analysis of the operation of gas turbines.

Prerequisites Fluid Mechanics I, Thermodynamics I, Turbomachinery.

Teaching methods Lectures, exercises, laboratory tutorials for the use of commercial software. Homework and personal assignments with the application of commercial software on real design and analysis problems. Utilization of information technology for the course management.

Assessment methods: Finalexamination, intermediate examination, assignment

Language of instruction Greek

Recommended bibliography [1] Gas Turbine Theory by G.F.C. Rogers, H. Cohen & Paul Straznicky ISBN 978-0132224376

[2] «Operation of Gas Turbines and Power Generation - Propulsion», A. Polyzakis

386 Emissions and Transport of Air Pollutants	Sm.	C.H.	ECTS
	9	4	4

Course title Emissions and transport of Air pollutants

Course code 386

Course type Elective

Course level Undergraduate

Year of studies 5

Semester 9

ECTS Credits 4

URL http://eclass.uowm.gr/courses/MECH185/

Hours per week 4

Instructor(s) John G. Bartzis

Course content Structure, Composition and Characteristics of the Atmosphere. Atmospheric Pollutants and Sources. The Phenomenon of Diffusion. Transport of Pollutants in the Atmosphere. Atmospheric Dispersion Modeling. Atmospheric dynamics. Instrumentation - Measurement of Meteorological Parameters. The Atmospheric Boundary Layer.

Expected

learning outcomes and competences to be acquired: The objective of this course is to teach the student the basic knowledge of physics and chemistry of the atmosphere, the pollutant sources, the mechanisms of environmental charges as well as the effects on health and on ecosystems. After the teaching of this course the student should include integrated approaches towards the assessment of environmental impact. Furthermore, he must acquire knowledge in order to deepen in the future in the specific scientific subject.

Prerequisites Chemistry, Introduction to computers, Physics I, Mathematical Analysis III, Fluid Mechanics, Numerical Analysis and Simulation, Thermodynamics I, Environmental Technology, Heat transfer.

Teaching methods Hours of Instruction 52 (Theory: 26, Exercises: 26)

Assessment methods: Final written exam (compulsory), Intermediate written exam (optional), Weekly exercises (compulsory).

Language of instruction Greek

Recommended bibliography

[1] Ι. Γ. Μπάρτζης (2008), Εκπομπές και Μεταφορά Αέριων Ρύπων, Διδακτικές Σημειώσεις.

[2] Μ. Λαζαρίδης (2005), Ατμοσφαιρική Ρύπανση με Στοιχεία Μετεωρολογίας, Εκδόσεις Τζιόλα.

[3] Ν. Μουσιόπουλος (1997), Φαινόμενα Μεταφοράς στην Ατμόσφαιρα, Εκδόσεις Γιαχούδη – Γιαπούλη.

[4] Χ. Ζερεφός (2001), Μαθήματα Φυσικής της Ατμόσφαιρας και Φυσικής του Περιβάλλοντος, Έκδοση Α.Π.Θ, Υπηρεσία Δημοσιευμάτων.

[5] Χ. Σ. Σαχσαμάνογλου, Τ. Ι. Μακρογιάννης (1998), Γενική Μετεωρολογία, Εκδόσεις Ζήτη.

[6] J. Seinfeld, S. Pandis (1998), Atmospheric Chemistry and Physics, Publication: John Wiley & Sons, Inc.

387 Environmental Management	Sm.	C.H.	ECTS
	9	**4**	**4**

Course title Environmental management

Course code 387

Course type Elective course

Course level Undergraduate

Year of studies 5

Semester 9

ECTS Credits 4

URL

Hours per week 4

Instructor(s) Areti Kontogianni

Course content Introduction to environmental management The concepts of ecosystem based approach and sustainable development - Engineering for Sustainability – Environmental Management Systems- Property rights and public goods - Science and public deliberation - Social perceptions of risk - Liability and enforcement - Command and Control policies – Economic instruments – Case studies on climate change mitigation and adaptation – Water management case studies – Energy policy case studies

Expected learning outcomes and competences to be acquired The course aims at familiarizing students of mechanical engineering with the basic principles of environmental management. After completion of the course the student should be able to:

- Understand the basic environmental management issues
- Discuss the available policy instruments
- Use various tools to design environmental management solutions in the private and public sector
- Be inspired by natural / biological systems in designing technological prototypes (biomimetics, biomimicry)

Prerequisites

Teaching methods Instruction of theory, discussion of applications, debate skills

Assessment methods 60% assignment, 40% final debate presentation.

Language of instruction Greek

Recommended bibliography T. Tietenberg, Economics of the environment and natural resources. Typothito Editions, Athens

388 Economic Valuation of Energy and Industrial Externalities	Sm.	C.H.	ECTS
	10	4	4

Course title Economic Valuation of Energy and Industrial Externalities

Course code

Course type Elective course

Course level Undergraduate

Year of studies 5

Semester 10

ECTS Credits 4

URL

Hours per week 4

Instructor(s) Areti Kontogianni

Course content Introduction to the concept of externalities – Institutional and legal context of externality valuation – Externalities in energy and industrial processes – Basic economic concepts - Overview of methods – Stated preferences and surveys: Contingent Valuation Method (CVM) – Designing a questionnaire – Collecting data – Analysis of data I: Descriptive statistics – Analysis of data II: Estimating WTP functions – Problems and case studies

Expected learning outcomes and competences to be acquired : After completion of the course the student should be able to:

- Describe in economic terms energy and industrial externalities
- Design a stated preference survey,
- Develop an appropriate research protocol
- Analyze the data collected.

Prerequisites

Teaching methods Instruction of theory, discussion of empirical applications, individual projects

Assessment methods Project work plan 5%, construction of research protocol 10%, intermediate report on field work 30% , final report 55%

Language of instruction Greek

Recommended bibliography Bateman, I.J., Carson, R.T., Day, B., Hanemann, M., Hanley, N., Hett, T., Jones-Lee, M., Loomes, G., Mourato, S., Ozdemiroglu, E., Pearce, D.W., Sugden, R., Swanson, J., 2002. Economic Valuation With Stated Preference Techniques: a Manual. Edward Elgar Publishing, UK. (Department for Transport).

199 The Mechanical Engineering Capstone project	Sm.	C.H.	ECTS
	5	4	4

Course title The Mechanical Engineering Capstone project

Course code 199

Course type Obligatory

Course level Undergraduate

Year of studies 3

Semester 5

ECTS Credits 4

URL

Hours per week 4

Instructor(s) Areti Kontogianni

Course content The Mechanical Engineering Capstone project is an early requirement for graduation. The course is a multifaceted assignment designed to encourage students to think critically, solve challenging problems, and develop research skills, planning, goal setting, and skills on oral communication, public speaking, teamwork, self-sufficiency, skills that will help prepare them for their thesis research and writing and generally for modern careers. The projects adopted by students should be interdisciplinary ie. requiring students to apply skills or investigate issues across many different subject areas or domains of knowledge, connecting their projects to community issues or problems, and integrating outside-of-school learning experiences, including activities such as scientific observations, interviews, or internships.

Specific content of taught crash courses includes: The role and importance of scientific research – The ethics of research – The research process: Basic terminology, choice of problem areas, revision of research – Structure of a research proposal – Systems of bibliographic reference – Plagiarism – Systematic literature review – Reference lists and bibliographic data bases – Debate techniques

Expected learning outcomes and competences to be acquired After completion of the course the student should be able to:

- Complete a research /review project
- Critically think about challenging problems

- Address interdisciplinary subjects and teamwork
- Recognize the writing techniques of different forms of scientific research
- Skillfully communicate his research results to peers
- Understand the oral and written rules of scientific reasoning

Prerequisites

Teaching methods Instruction of theory, discussion of applications and individual projects, community based learning, project based learning

Assessment methods 30% participation in class, 70% final assignment

Language of instruction Greek

Recommended bibliography Material assembled by the instructor

389 Risk Management and Safety of Large Industrial Systems	Sm.	C.H.	ECTS
	9	4	4

Course title Risk Management and Safety of Large Industrial Systems

Course code 389

Course type Obligatory

Course level Undergraduate

Year of studies 5

Semester 9

ECTS Credits 4

URL

Hours per week 4

Instructor: I. Bakouros

Prerequisites:

Course content: This course covers the scientific area of Risk Management and Safety of Large Industrial Systems with emphasis to Petroleum Industry. The following subjects are covered In details:

Safety and loss prevention, definition of hazard, risk and risk assessment, scope and outline of risk management, frequency and severity, intrinsic and extrinsic safety, risk balance, Pareto principle, epidemiological approach, hazard warning. Identification of hazards and basic definitions: toxicity, flammability, sources of ignition, fires, explosions, ionizing radiation, noise pollution, temperature and pressure deviations. Fire protection: classification of fires, fundamentals of fire suppression, fire protection systems and facilities, thermal radiation. Hazard and operability studies (HAZOP): basic principles, explanation of guide, procedures, critical examination of flow sheets. Risk analysis; acceptable risks and safety priorities, frequency of accidents, safety checklists and fault trees, assessment of risks from complex plants. Strengths and limitations of quantitative risk assessment, modeling, a systematic approach to risk reduction, human factors, and management of process safety, insurance. Industrial hygiene, identification MSDS, evaluating exposure to volatile toxicants. Flow of fluids through a pipe, liquids through pipes Toxic release and dispersion models, parameters affecting dispersion.

Expected learning outcomes and competences to be acquired : The objective of the course is to 1) Develop an understanding of the fundamental principles underlying safety and risk management. Understand issues related to the practical application of safety and risk management. 2) Develop management skills related to planning, developing and report writing activities. Develop some understanding of the professional obligations related to the discipline of safety and risk management.

Teaching: Lectures, Notes, Related Practical Guides, Internet Sources

Thesis Diploma Thesis	Sm.	C.H.	ECTS
	9-10	-	30

Course title Diploma Thesis

Course code -

Course type Mandatory

Course level Undergraduate

Year of studies 5

Semester 9-10

ECTS Credits 30

URL

Hours per week -

Instructor(s) -

Course content*: Each student can chooses a thesis topic to develop the thesis. The only limitation to this option is that the thesis should correspond to one discipline (at least) from the courses included in Concentration of Studies, which he himself attended.*

The assignment of the thesis is at the beginning of the ninth semester and preparation is undertaken throughout the period of the fifth year of study.

Expected learning outcomes and competences to be acquired*: This extended written project is an extensive study in a scientific area of the Department. The thesis is meant to demonstrate that the student is able to work and to pursue science in a specific subject.*

7. OTHER USEFUL INFORMATION

7.1. University Administration

Executive Committee Board

Park St. Demetrios 50100, Kozani

Tel 24 610 56 200. FAX 24610 56201.

Alternatively, the information provided is offered to the public through the website: www.uowm.gr.

7.2. Internships

The Department of Mechanical Engineering instituted student internships providing industrial placements, and has submitted a funding proposal to form an integral part of the curriculum. Students are advised to apply to the Secretariat for a placement after this has been secured by prior agreement between the Department and the companies, clearly defining the terms of employment and work responsibilities during the internship,. After assessing the applications, the program coordinator, Prof. G. Marnellos and cooperating faculty members that coordinate with each company participating in the placement program, the selected students will be assigned to the selected companies.

The practice could **potentially** replace the Engineering Design Project and be awarded the corresponding ECTS credits. The duration of the internship will be three (3) months, mainly during the summer (June, July and August). Entitled students to participate in the Internship program must have finished the third year of study. Final year, graduating students will be granted preference for participation in internships.

7.3. STUDENT ACCOMODATION AND CATERING

In assisting students who face financial hardship to cope with their studies and based on both decrees and decisions of the Executive Committee of UoWM, it is provided:

a. Free meals to beneficiary students / only three, in the student restaurant of UoWM located in the city of Kozani (Address: Philipou B’ 7 - Kozani, tel 24 610 32 712)

b. Rent assistance if not provided by the state.

The conditions for the free meals and administration of those benefits (if available) and dates for submitting applications, will be announced promptly by the Secretariat

7.4. Medical Care

Health, medical and nursing care are offered to all students (undergraduate, graduate, expatriates and foreigners) for a period equal to the years under study as a minimum duration of undergraduate study plus two years.

To this end the University Grants brochure healthcare that can be used by students at the location of the university and only in exceptional cases outside this.

If the student is entitled additional health coverage, directly or indirectly by another health care insurer, and still wants the student health care plan, should first forgo insurance from the other provider and choose the one with the Solemn Declaration under Law 1599/86, stating that "it is not insured by any other insurer."

Additional information on the health care is provided in the Healthcare booklet as issued by the Secretariat.

7.5. Student transportation discounts

Every student is granted a special Student transportation discount card lasting seven (7) years. This card is valid throughout the year (1 September - 31 August). At the beginning of each academic year new students are issued the card. In case of loss, a new card is issued, within two (2) months after the declaration of loss that should filed at Secretariat.

The discount is offered to students (Ministerial Act99/22-08-90) is:

25% on urban transport in the city where the Department is located, and urban transport in the rest of the country

25% in long distance road transport linking the location of the Department with their permanent student residence and long-distance transport in the country

25%.;in group (minimum 15 people) travel within Greece with Olympic Airways

50% on rail services across the country.

This card is handed to Secretariat upon graduation. Students enrolling as graduates of other University departments under special examinations are not entitled to a student discount card.