UNIVERSITY OF WESTERN MACEDONIA

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL
AND COMPUTER ENGINEERING

STUDY GUIDE
2022 – 2023

Kozani, October 2022

CONTACT US

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Welcome Note

Dear Students,

The Study Guide you currently hold (or reading on your screen) presents the Undergraduate Program of the Department of Electrical and Computer Engineering, of the University of Western Macedonia (DECE-UOWM).

The Study Guide has been designed to introduce you to the organization of the Department, to present useful information, and specifically to provide you with an outline of the curriculum through a presentation of each course offered. The Department of Electrical and Computer Engineering evolved from the Department of Informatics and Telecommunications Engineering, which started its operation in 2005.

This guide presents the academic organization and administrative structure of the University, the Department and the Faculty of Engineering to which it belongs.

At the same time, information is given regarding the Professors, the teaching and administrative staff, the location of the University, and the teaching and laboratory facilities of the Department. Information is also provided on student matters, topics of study organization, internships, information for the content, learning objectives and indicative bibliography of each course, as well as information on the study directions. This Program is similar to the Curriculum in the respective ECE Departments in Greece and abroad. It has reached its present form through a series of improvements and updates over the last 10 years, following the developments in the science and technology of the related subjects, which are rapidly evolving. Therefore, as a student you will be trained in modern and evolving fields such as signal and data analysis, computer systems, information processing, transmission and coding, electronic devices, mobile and satellite communications, automation systems, electrical power systems, renewable energy sources, smart energy grids, etc. Some of the introductory courses are offered jointly (co-teaching) with the Department of Mechanical Engineering, following the modern practices of co-teaching basic courses in other Engineering Departments. In addition to the classical educational process, the Department also offers internships with links to local industry and business, as well as international student exchanges through the IAESTE and ERASMUS+ programs.

The Department has excellent infrastructure and laboratories, and during this time period significant investment is being made in further developing its laboratory and research infrastructures through European or National/Regional Funds. The Department is characterized by its young age, strong extroversion and intense research activity.

Georgios C. Christoforidis	Markos Tsipouras
Professor, Head of Department	Associate Professor, Vice Head

UNIVERSITY OF WESTERN MACEDONIA

FACULTY OF ENGINEERING (Kozani)

Department Electrical and Computer Engineering	(ece.uowm.gr)
Department of Mechanical Engineering	(mech.uowm.gr)
Department of Chemical Engineering	(chemeng.uowm.gr)
Department of Mineral Resources Engineering	(mre.uowm.gr)
Department of Product and Systems Design Engineering	(ide.uowm.gr)

FACULTY OF SOCIAL SCIENCES AND HUMANITIES (Florina)

Department of Elementary Education	(www.eled.uowm.gr)
Department of Nursery Education	(www.nured.uowm.gr)
Department of Psychology	(psy.uowm.gr)
Department of Communication and Digital Media (Kastoria)	(cdm.uowm.gr)

FACULTY OF FINE ARTS (Florina)

Department of Fine and Applied Arts	(www.eetf.uowm.gr)

FACULTY OF ECONOMICS (Kozani)

Department of Regional and Cross-border Development	(rdcbs.uowm.gr)
Department of Administrative Science and Technology	(mst.uowm.gr)
Department of Accounting and Finance	(accfin.uowm.gr)
Department of Business Administration and Management (Grevena)	(ba.uowm.gr)
Department of Statistics and Insurance Science (Grevena)	(stat.uowm.gr)
Department of Economics (Kastoria)	(econ.uowm.gr)
Department of International and European Economic Studies	(iees.uowm.gr)

FACULTY OF SCIENCES (Kastoria)

Department of Informatics	(cs.uowm.gr)
Department of Mathematics	(math.uowm.gr)

FACULTY OF AGRICULTURAL SCIENCES (Florina)

Department of Agriculture	(agro.uowm.gr)

FACULTY OF HEALTH SCIENCES (Ptolemaida)

Department of Obstetrics	(mw.uowm.gr)
Department of Occupational Therapy	(ot.uowm.gr)

DEPARTMENT'S ADMINISTRATION

Head

Christoforidis Georgios, Professor

Vice Head

Tsipouras Markos, Associate Professor

Teaching and Research Staff

1. Angelidis Pantelis, Professor
2. Asimopoulos Nikolaos, Professor
3. Verykoukis Christos, Assistant Professor
4. Gavros Konstantinos, Associate Professor
5. Ganatsios Stergios, Professor
6. Dasygenis Minas, Assistant Professor
7. Zygiridis Theodoros, Associate Professor
8. Louta Malamati, Associate Professor
9. Lazaridis Vassilios, Lecturer
10. Mastoras Ioannis, Lecturer of Applications
11. Mavrozoumis Konstantinos, Lecturer of Applications
12. Michalas Angelos, Professor
13. Bibi Stamatia, Assistant Professor
14. Bisbas Antonios, Professor
15. Bouchouras Angelos, Assistant Professor
16. Parisis Konstantinos, Professor
17. Ploskas Nikolaos, Assistant Professor
18. Poulakis Nikolaos, Professor
19. Sarigiannidis Panagiotis, Associate Professor
20. Stergiou Konstantinos, Professor
21. Stimoniaris Dimitrios, Assistant Professor
22. Tavoultzidou Stavroula, Assistant Professor
23. Tsalikakis Dimitrios, Lecturer
24. Tsiamitros Dimitrios, Associate Professor
25. Fragulis Georgios, Professor

Staff representatives

Representative of Laboratory Teaching Staff: Vlahopoulos Dimitrios

Special Representative of Technical Laboratory Staff: Not elected

Student representatives

Undergraduate Student Representative: Vassilios Bakavelos, Vassilios Stasinis

General Information

The Department of Electrical and Computer Engineering was founded in 2005 and is located in the city of Kozani. In the academic year 2005 - 2006 the department opened its doors to the first students and also began its operation as Department of Informatics and Telecommunications Engineering and in the academic year 2019-2020 it evolved into Department of Electrical and Computer Engineering. In the academic year 2021-2022 of newly admitted students stands at 117 (excluding transfers), while the number of enrolled students rises up to 800.

To fulfill the instructional requirements, the Department has 26 Professors and Lecturers, 6 members of Laboratory Teaching Staff, 3 members of Laboratory Technical Staff, Professors from other University Departments and the required number of part-time staff.

DEPARTMENT STAFF

PROFESSORS/LECTURERS

PROFESSORS

Angelidis Pantelis

- Diploma, Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki (1989).
- Ph.D., Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki (1993).
- Subject: Bioinformatics - Biomedical Signal Processing.
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Asimopoulos Nikolaos

- PhD, Department of Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, July 1990.
- MSC Department of Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, July 1983.
- Diploma in Electrical Engineering, Aristotle University of Thessaloniki, November 1980.
- Subject: Digital Systems.
- email: asimopou@uowm.gr

Bisbas Antonios

- 1987, July: BA in Mathematics, Aristotle University of Thessaloniki
- 1991, December: Doctoral Degree, Aristotle University of Thessaloniki.
- Subject: General Mathematics.
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Christoforidis Georgios

- 1993 - 1998: Diploma in Electrical Engineering, Dep. In Electrical and Computer Engineering, School of Engineering, Aristotle University of Thessaloniki.
- 1998 - 1999: MSc Power Electronics & Drives, Department of Electrical & Electronic Engineering, University of Birmingham, England.
- 2000 - 2004: Doctoral Degree on: "Contribution to the Calculation of the Inductive Effect of Transmission Lines on Underground Metallic Pipes", Vol. In Electrical and Computer Engineering, School of Engineering, Aristotle University of Thessaloniki.
- Subject: Electric Power Systems.
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Fragulis George

- Aristotle University of Thessaloniki Degree in Mathematics, Faculty of Mathematics, Faculty of Mathematics, Aristotle University of Thessaloniki, (1981-1985).
- Aristotle University of Thessaloniki Doctor of Computer Science (Theory of Control), Mathematics, Department of Computer Science and Numerical Analysis, School of Physics and Mathematics, Aristotle University of Thessaloniki (1986-1990).
- Subject: Information Technology.
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Ganatsios Stergios

- 1977 - 1981 Faculty of Physics, University of Bucharest, Nuclear Physics specialty.
- 1981 - 1982 Postgraduate course at the School of Nuclear Physics.
- 1985 - 1990 Doctoral dissertation in the Faculty of Physics of the University of Bucharest.
- Subject: Electronics-Microelectronics.
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Michalas Angelos

- Degree in Mathematics, University of Crete (1989)
- Postgraduate Diploma in Distributed and Parallel Systems, University of London (1992)
- Diploma in Electrical and Computer Engineering, National Technical University of Athens (2001)
- Doctoral Diploma, Dept. Of Electrical and Computer Engineering, National Technical University of Athens (2003)
- Subject: Computer Networks.
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Parisis Constantinos

- 1975 - 1980: Diploma in Electrical Engineering, Dept. of Electrical Engineering, School of Engineering, Aristotle University of Thessaloniki
- 1991 - 1995: Doctoral Degree on "Frequency Control in Interconnected Power Systems", Dept. Of Electrical and Computer Engineering, School of Engineering, Aristotle University of Thessaloniki
- Subject: Automated Control Systems.
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Poulakis Nikolaos

- 1988: Bachelor of Physics, Dep. School of Physics, School of Sciences, NERC
- 1997: Doctoral Degree on "YBCO Series Raman Spectroscopy Study", Department of Physics, School of Applied Mathematics & Science, NTUA

- Subject: Measurement Technology.
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Stergiou Constantinos

- Diploma, Department of Computer Engineering & Informatics, University of Patras (1995).
- Postgraduate Diploma of Specialization, Department of Computer Science UMIST, UK (1997).
- Doctoral Degree, Department of Computer and Information Science, University of Strathclyde, UK (2001).
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ASSOCIATE PROFESSORS

Gavros Constantinos

- Bachelor of Electronic Engineering, UNIVERSITA DEGLI STUDI DI PAVIA (ITALIA), with a thesis: "Power Generation Stations - Operation and Automation", 1983
- Doctoral thesis on "Monitoring and diagnosis of induction motors", Faculty of Electrical Engineering, Polytechnic University of Bucharest, 2008
- Subject: Supervisory and Diagnostic Testing of Electrical Machines.
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Louta Malamati

- Diploma, School of Electrical and Computer Engineering, National Technical University of Athens (1997).
- Ph.D., School of Electrical and Computer Engineering, National Technical University of Athens (2000).
- Postgraduate Diploma of Specialization in "Techno-Economic Systems", National Technical University of Athens, National and Kapodistrian University of Athens, (2004).
- Subject: Designing Communications Networks and Supporting Advanced Telecommunication Services.
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Sarigiannidis Panagiotis

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- PhD, Department of Informatics, Aristotle University of Thessaloniki (2007).
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Stimoniaris Dimitrios

- 1983 - 1990: Diploma in Electrical Engineering, School of Engineering, Aristotle University of Thessaloniki
- 2004-2006: Postgraduate Diploma of Specialization in Energy and Renewable Energy Systems Technologies, Faculty of Engineering, Department of Electrical and Computer Engineering, Democritus University of Thrace.
- 2011 - 2016: Doctoral Degree, School of Electrical and Computer Engineering, National Technical University of Athens.
- Subject: Application of Microwaves to Electrical Systems with Renewable Energy Penetration.
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Tsiamitros Dimitrios

- 1996 - 2001: Diploma in Electrical and Computer Engineering, School of Engineering, Aristotle University of Thessaloniki
- 2001 - 2005: Doctoral Degree on: "Influence of heterogeneous land on transient behavior of overhead power lines and underground power cables", ed. Of Electrical and Computer Engineering, School of Engineering, Aristotle University of Thessaloniki
- Subject: Electromagnetic Compatibility - Electricity Transmission Lines.
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Tsipouras Markos

- 1999 Degree in Computer Science from the University of Ioannina in 1999.
- Postgraduate qualification in Informatics in 2002.
- Doctorate in Computer Science in 2008, from the same department.
- Subject: Digital Signal Processing.
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Zygiridis Theodoros

- Diploma, Department of Electrical and Computer Engineering, University of Thessaloniki (2000)
- Ph.D., Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki (2006).
- Subject: Applied Mathematics and Computational Methods for Electromagnetic Field Problems.

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ASSISTANT PROFESSORS

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- Diploma, Department of Electrical and Computer Engineering, Democritus University of Thrace (1999).
- Ph.D., Department of Electrical and Computer Engineering, Democritus University of Thrace (2005).
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Bibi Stamatia

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- Subject: Software Technology.
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- PhD, Dept. Of Electrical & Computer Engineering, Aristotle University of Thessaloniki (2010)
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Oureilidis Konstantinos

- Diploma in Electrical Engineering, Dept. Electrical and Computer Engineering, Polytechnic School, Aristotle University of Thessaloniki (2008)
- Degree in Organization and Business Administration, Dept. of Business Organization and Management, Faculty of Business Administration, University of Macedonia (2015)
- Doctoral Diploma on the topic: "Methods of Decentralized Microgrid Control with RES for the Improvement of Operation in Permanent and Transient Status", Dept. Electrical and Computer Engineering, Polytechnic School, Aristotle University of Thessaloniki (2015)
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Ploskas Nikolaos

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Tavoultsidou Stavroula

- 1995 Postgraduate Diploma in Linguistics (MA in Linguistics –TESOL / English Language Teaching), University of Surrey, Guildford, M.B.
- 1979-1983 Bachelor of English Language and Literature, Department of English Language and Literature, School of Philosophy, Aristotle University of Thessaloniki, Thessaloniki
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LECTURERS

Lazaridis Vassilios

- Degree in Computer Engineering, Department of Electrical Engineering, Technical University of Budapest (1990).
- PhD, Department of Applied Informatics, University of Macedonia (2006).
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Mastoras Ioannis

- 1975 - 1979: Diploma of Higher School of Electronics Thessaloniki "EKLIDIS"
- 2004 - 2008: Postgraduate Diploma in MCs. on "Quality Assurance", Dept. Computer Science, School of Sciences, Hellenic Open University of Patras.
- Subject: Automated Control Systems.
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Mavrozoumis Constantinos

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- Subject: Physical Education.
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Tsalikakis Dimitrios

- Degree, Department of Mathematics, Faculty of Sciences, University of Ioannina (2001).
- Ph.D., School of Medicine, University of Ioannina (2006).
- Subject: Electrophysiological Data Modeling and Analysis.

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LABORATORY TEACHING STAFF

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Vlachopoulos Dimitrios

- Degree in Electrical Engineering, TEI Western Macedonia (1994)
- Degree in Informatics, Hellenic Open University (2009)
- Postgraduate Diploma in Applied Informatics, University of Macedonia (2014)
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Galfas Nikolaos

- Degree in Electrical Engineering, TEI Of Western Macedonia (2005)
- Postgraduate Diploma in "Renewable Energy Sources and Energy Management in Buildings", TEI Of Western Macedonia (2017)
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Dimitriadis Dimitrios

- Degree in Electrical Engineering, TEI Western Macedonia (1992)
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Kollatou Theofano

- Diploma in Electrical & Computer Engineering, Department of Electrical & Computer Engineering, Polytechnic School, AUTH (2005)
- Master's Degree, "MRes in electromagnetics in the analysis and design of Communication and High-speed systems", University of Nottingham, UK(2006)
- PhD, "Use of metamaterials in electromagnetic compatibility applications_ metamaterial absorbers", Department of Electrical & Computer Engineering, Polytechnic School, AUTH (2014).

- Subject: Visualization of Algorithms and Development of Educational Software
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Kyriakidis Thomas

- Diploma in Electronic & Computer Engineering, Department of Electronic & Computer Engineering, Polytechnic School, Technical University of Crete (2003)
- Postgraduate Specialization Diploma, Business Informatics, Department of Applied Informatics, University of Macedonia (2006)
- PhD, Department of Informatics and Telecommunications Engineering, Polytechnic School, University of Western Macedonia (2013)
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Protopsaltis Antonios

- Bachelor of Computer Science (BSc Computer Science), Concordia University, Montreal Canada (1994)
- MSc Computer Science - Software Engineering), Concordia University, Montreal Canada (1996)
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SPECIAL TECHNICAL LABORATORY STAFF

Papastamos Christos

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Paschopoulos Asterios

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Salakidis George

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ADMINISTRATIVE STAFF

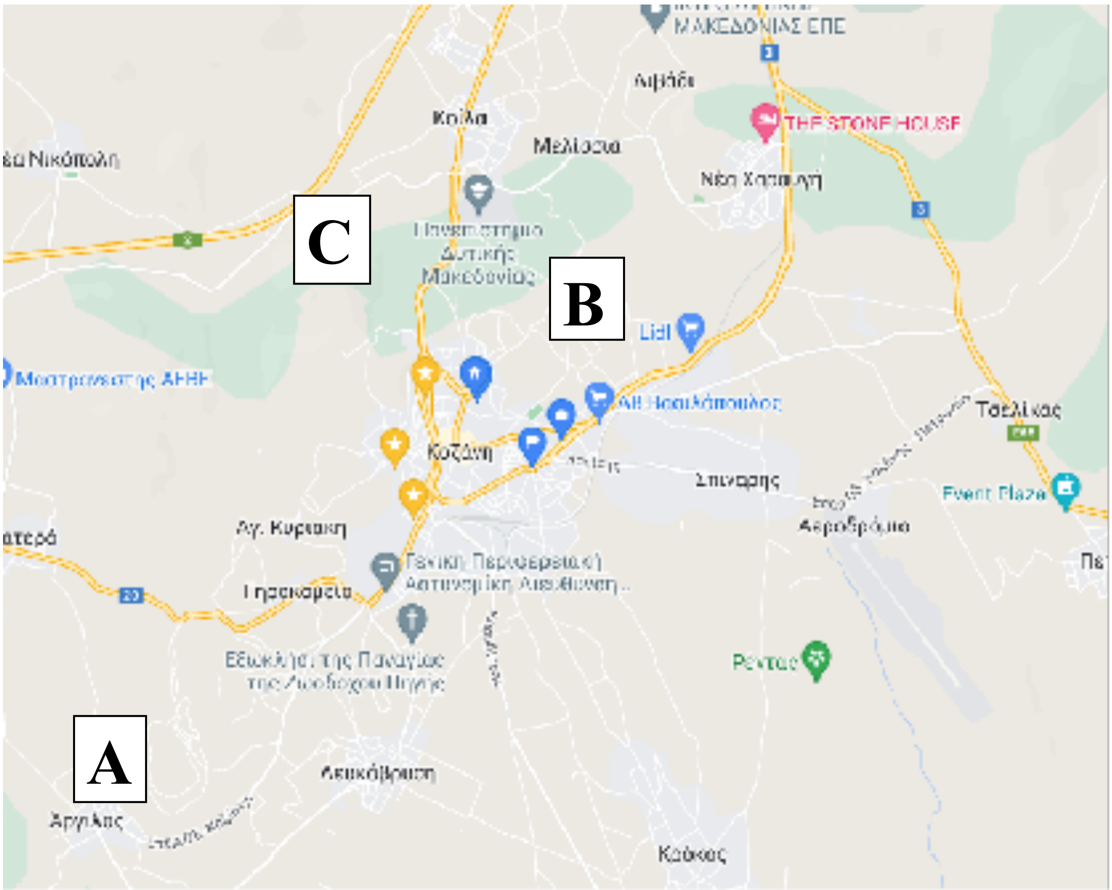
Meliou Vassiliki (Secretary of the Department, vmeliou@uowm.gr)

Trigoni I. Theodora (dtrigoni@uowm.gr)

Trigoni P. Theodora (ttrigoni@uowm.gr)

THE DEPARTMENT

The Department of Electrical and Computer Engineering is located in Kozani (70,420 inhabitants), capital of the prefecture of Kozani and headquarters of UOWM. It is one of the five Departments of the polytechnic school of UOWM. The Department's activities are carried out in the University's new privately owned building in the Active Urban Development Zone (ADZ) located South-West of Kozani (A) where the Department's Secretariat is also based, in premises at the eastern entrance of the City (which will cease to function at the end of the winter semester) (B) at a distance of 2 km from the city center and in Koila (C), at a distance of 3 km from the city center. The buildings are connected to the city by public transport.



The three main buildings of the Department (A), (B), (C).

General Issues Concerning Undergraduate Studies

The duration of studies at the Department lasts five years and is divided into ten semesters, which are differentiated into fall and spring semesters. Each student selects the courses that he will attend and will be examined in at the beginning of each semester, on dates which are announced by the Administration/Course Office. During the 10th semester a compulsory dissertation is drafted.

Successful study leads to the award of a single and integral diploma equivalent to master's degree (integrated master), according to the Government Gazette τ.Β '2318 / 2-6-2021.

For the freshmen of the academic year 2021-2022, a total of 56 courses are required to obtain a degree, as well as writing a dissertation.

The academic year begins on 1st September of each year and ends on 31st of next August. The teaching prerequisite of each academic year is divided into two semesters. Each semester consists of at least 13 full weeks of teaching and three weeks of examinations. The first semester begins in late September and the second closes at the end of June. If the minimum number of teaching weeks is not completed in a course, then this course is not considered to be taught and it cannot be examined. In case of examining a non-taught course, the test is invalid and its grade is not considered in the final score of the degree. By decision of the Executive Committee, following a proposal by the General Assembly of the Department, an extension of the semester could be authorized up to a maximum of two weeks, in order that the required minimum number of teaching weeks is completed.

The courses, except for the examination periods, are interrupted from Christmas Eve until the day of Epiphany, on Ash Monday or Monday of Lent and from Megali Deytera-Good Monday (The last Monday before Easter) until Low Sunday. No classes are held or exams take place during weekends and the following holidays and national days:

October, the 11th	**The Liberation of Kozani**
October, the 28th	The National Day of “OXI” (NO)
November, the 17th	The National Day of “Polytechnio” (Engineering School)
December, the 6th	Ag.Nikolaos-St. Nicholas Day - patron saint of Kozani

January, the 30th	Three Hierarchs Holiday
March, the 25th	The National Day of the 1821 Revolution
May, the 1st	1st May/Labor Day
Holy Spirit Day	Mobile Religion Holiday

In addition, classes are not held on the day of student elections.

Examinations are conducted exclusively after the fall and the spring semester for courses taught during these semesters, respectively. The student has the right to be examined in the courses of both semesters before the start of the fall semester. Each student is entitled to participate in examinations only of those courses which he has determined with the courses statement he lodged at the beginning of the semester.

The exam score of the students in each course is determined by the professor, who organizes it according to his best judgment written and/or oral examinations or relies on projects or laboratory exercises. In case of failure in a compulsory course, the student is obliged to repeat it in the following semesters or exams using the electronic platform of the institution exams.uowm.gr. In case of failure in a compulsory course, the student is obliged to repeat it in the following semesters.

The selection and receiving process of textbooks is performed through the "Eudoxus" Program (www.eudoxus.gr). Students have the right of choice and of the free supply of one textbook for each course taught. Overall, students are allowed to select and receive a number of free textbooks which is equal to the total number of compulsory and elective courses necessary for obtaining the degree. If students choose more elective courses than what is required for obtaining the degree, the right of choice and of the free supply of textbooks does not extend to the extra courses they have chosen and are tested, even when these courses are considered in obtaining their degree.

Students have the right to interrupt their studies, upon written request at the Administration Office of the Department, for as many semesters, consecutive or not, as they wish to, and certainly for no more than the minimum number of semesters required to receive a degree according to the indicative curriculum. These semesters are not calculated in the above maximum duration of Studies. Students who interrupt their studies as above, do not maintain the student membership throughout the period of interruption of their studies. At the end of the interruption of their studies, the students can return to the Department.

INFRASTRUCTURE

The Department of Electrical and Computer Engineering is housed in three buildings located at the eastern entrance of the city of Kozani, on Lygeris and K. Karamanli Street and Koila Kozani.

The following educational laboratories operate in the Department:

- Renewable Energy Sources & Smart Electric Grids
- Industrial Electrical Installations
- Networks
- Indoor Electrical Installations
- Computer (6)
- Electrical Machines
- Electronics
- Electronic Health & Biomedicine
- Electronic Power and Electric Propulsion Systems
- Electronic constructions
- Electrotechnics
- Foreign languages and terminology#
- Robotics
- Electricity Systems
- Telecommunications
- Digital Systems & Computer Architecture
- Digital Systems & Electronics

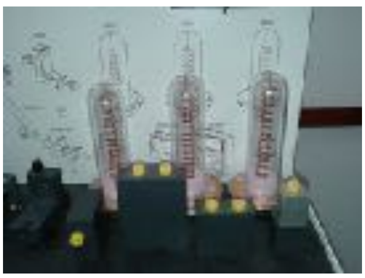
Microsoft SQL Server	Android SDK	Opnet	FINE/ADAPT
XAMP	ARM IDE	Xilinx	SEE Electrical
Java SDK	Multisim	Xsniffer	GAMS
	Logisim	WEKA	

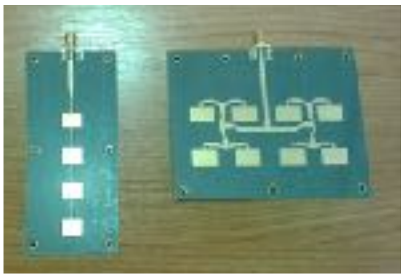
TELECOMMUNICATIONS LABORATORY

The Telecommunications Laboratory supports the educational activities in various courses of the study program and its equipment includes the following:

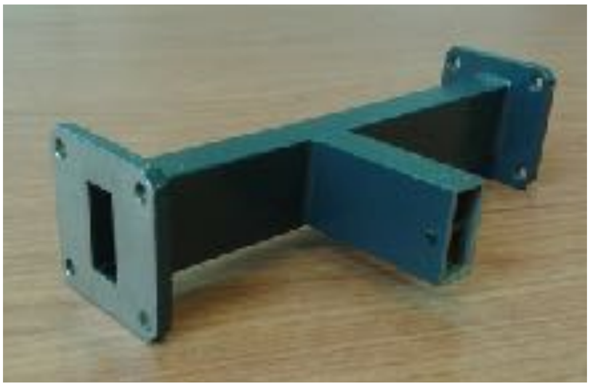
- Telecommunications Training System (25 work stations) for experimental training of students on the fundamental principles of analog and digital communications. Specifically, for each work station, the Telecommunications Training System consists of a preprinted circuits base which provides a computer connection, in which removable exercise boards are installed for the training of students of the Department on the Analog and Digital Communications.

- Educational Antennas System (10 work stations), providing practical experimentation on different types of antennas (e.g., horn type, helix type, flat, Yagi) at 1 GHz and 10 GHz frequencies.





- Microwave Communications Educational Systems (3 work spots).

- Spectrum analyzers, oscilloscopes and generators of random waveforms.
- Selective radiation meter Narda SRM-3006, for measurements within the frequency range 27 MHz – 3 GHz.
- Network analyzer Keysight E5063A for testing passive components, such as antennas, cables, filters, PCBs, within the frequency range 100 kHz – 4.5 GHz.


- Training system of plastic optical fiber, with the ability to measure losses, consisting of a two-channel data transmission system.

- Double Sided Vacuum UV unit with the ability to produce single / double sided PCB through exposure to UV radiation and Tri-Tank unit with triple integrated function: DEVELOP / SPRAY WASH / BUBBLE ETCH.

Laboratory Of Microcomputers And Computer Networks

The Microcomputer and Networks lab is equipped with state-of-the-art personal computers connected to a modern LAN, a Sun Blade server and specialized electronic training materials for multi-course service. It has:

- Personal Computers (64bit i5 processors, Windows 10 multiuser environment)
- Gigabit Ethernet LAN
- 2 Gigabit managed Linksys switches (full dublex mode)
- dual ultraSPARC 64bit Sun Blade server
- Xilinx FPGA boards
- Mikroelectronica development boards equipped with Microchips' PICs

PCI and USB Data Acquisition Cards of National Instruments

Digital Systems and Computer Architecture Laboratory

The Digital Systems and Computer Architecture Laboratory meets the research and training needs in both core courses and in specialization courses of the Department. The Laboratory includes:

- 30 work stations with Intel I5 / 2GB Ram computer stations,
- 3 development inventors kit with Arduino microprocessor,
- 9 reconfigurable logic boards FPGA Xilinx Spartan 3A,
- 2 development kit devkit8000 with TI OMAP3530 (600MHz ARM Cortex-A8) processor, with a touch screen,
- 2 beagleboard development kit with ARM Cortex-A8 processor with DSP support, 4 mobile android units,
- 2 sets of lego mindstorm.

Also, under the management of the Laboratory are:

- an array of two computers with 4 parallel processing Nvidia Geforce 9800GTX graphics cards,
- a parallel system with 16 Xeon E5520@2.27GHz 76GB RAM processors,
- 4 servers with dual core Intel (R) Xeon (TM) CPU 3.40GHz / 8GB RAM processors. The computer operating systems are FreeBSD 9.0, Ubuntu 12 LTS, Microsoft Windows 7.

Laboratory equipment is also used for the dissertations of students in related subjects, as well as the research needs of the Department in matters related to software and hardware co-design, integrated systems-on-a-chip (SoC) and multi-core systems.


Flask

LABORATORY OF DIGITAL SYSTEMS AND ELECTRONICS

The Digital Systems and Electronics laboratory is used for laboratory exercises training as well as for the diploma theses of the students in related subjects. Laboratory exercises are performed at a physical component level. It concerns analog and digital systems in 20 work stations. Each work station in the laboratory is equipped with:

- HAMEG 20MHz Analog Oscilloscope
- Digital TEKTRONIC Oscilloscope 100MHz
- Generator AF HAMEG 5MHz
- Triple output DC power supplies
- Integrated XELTEK Developer
- Breadboard

ELECTRONICS CONSTRUCTION LABORATORY

The laboratory supports student work in related subjects and research activities by developing and constructing prototype electronic devices. The laboratory exercises are performed at the physical level of the component. The laboratory includes a system for designing and manufacturing original electronic boards, equipment for welding and detaching integrated circuits and equipment for measuring and controlling boards.

LABORATORY OF ELECTRONIC HEALTH AND BIOMEDICAL TECHNOLOGY

The Laboratory of Electronic Health and Biomedical Technology supports the courses “Biomedical Technology”, “Electronic Health” and “Bioinformatics”. In particular, it allows the training of students in the following:

Recording and analyzing of basic biosignals

- Recording and analysis of Electrocardiography with a wireless cardiograph.
- Measurement of arterial blood pressure with wireless sphygmomanometer.
- Measurement of lung function: Spirometry with wireless spirometer.
- Measurement of blood oxygenation with wireless oximeter.
- Take of cardiotocographic signal.

Digital Processing of Biological Signals

Methods and signal processing techniques derived from biological systems, signals and systems, design and implementation of digital filters, applications.
Use of fluorescence microscope for taking and processing biological sample images.

Introduction to Medical Imaging Systems

Management and editing images from computed tomography (CT Scan), Magnetic Resonance Imaging (MRI), endoscopy systems, ultrasound scanner. Reconstruction Methods of Medical Image: Image reconstruction algorithms (single backprojection, filtered backprojection, iterative reconstruction algorithms), defects in the reconstructed images, three-dimensional tomography.

Online health care

Provision and demand of online medical information, medical interventions through the Internet (such as tele-therapy) and peer support networks (p2p) in virtual medical communities. The online use of search methods and the use of the internet to support clinical trials. Health Portals. Telemedicine services and applications. Mobile and Wireless Communications in Health Care.

- Constant resistors
- Variable resistors
- Ohmic, inductive, capacitive loads
- RLC variable loads
- Frequency generators
- Digital energy analyzers

LABORATORY OF RENEWABLE ENERGY SOURCES AND SMART ELECTRIC GRIDS

The laboratory equipment is used for the diploma theses of students (undergraduate and postgraduate) in related subjects as well as for research purposes - research projects. The laboratory equipment includes:

<u>Microgrid No1:</u>
• Autonomous (island) inverter
• 2 (Two) PV inverters
• 12 PV panels with a nominal power of 2 kWp
• 1 (One) horizontal axis wind turbine 1 kW
• 24 FLA batteries
• Various loads, NI data recovery cards: DAQ 6008, Measuring devices

Microgrid No2:

- 2, 1.2kW hydrogen fuel cells with the corresponding inverters
- 2 electrolysis units and two hydrogen storage cans
- 1 inverter
- 1 wind turbine 1.5 kW, vertical axis
- 10 thin-film PV panels with a nominal power of 1 kW with the PV-inverter
- 24 FLA batteries with a capacity of 323 Ah each
- 1 electric car
- 1 electric scooter
- 1 electric bicycle
- 2 charging stations (level 1 and level 2) made in the UOWM

Microgrid No3 - charging station for electric cars from RES (In collaboration with the municipality of Kozani):

• 3 electric cars

• 3 floor chargers made in UOWM

• 1 wall quick-charger

• 48 FLA batteries for autonomous systems

• 2 island inverters

• 36 PV panels on the roof

• 2 PV inverters

Building energy inspection equipment:

• 1 ISO9869 Hukseflux TRSys 01 temperature meter

• 2 infrared (IR) cameras

• 1 Laser mini thermometer

• 1 Fluke Energy Analyzer

• 1 Photometer and 1 Hygrometer

• 1 Digital exhaust analyzer

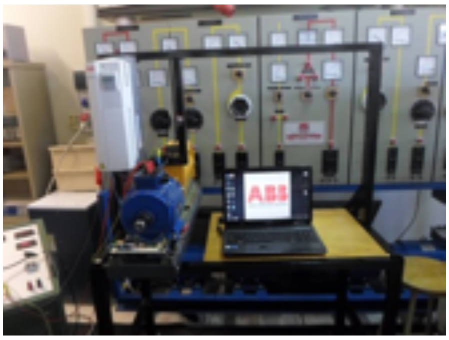
LABORATORY OF INTERIOR ELECTRICAL INSTALLATIONS

The laboratory equipment is used for the diploma theses of the students (undergraduate and postgraduate) in related subjects. The laboratory has:

- 8 workstations - Simulations for indoor electrical installations
- Electrical panels
- Complete ground simulation device
- 4 work stations / KNX system layouts
- 4 Portable KNX system training devices

Laboratory Of Electric Machines

The laboratory equipment is used for the diploma theses of the students in related subjects and includes:



- 3 complex excitation DC motors
- 2 series DC excitation motors
- 3 DC machines of parallel excitation
- 5 three-phase modern AC generators
- 12 three-phase asynchronous induction motors
- 2 single-phase asynchronous induction motors
- 5 three-phase power supplies with adjustable voltage and the possibility of dc voltage supply.
- 3 three-phase transformers
- 4 single-phase transformers
- Parallel display system of three-phase modern generators
- 2 modern systems for measuring torque, speed and mechanical power of engines
- 2 soft-starter asynchronous motors
- 4 new work stations with measuring instruments (current, voltage, speed meters)

Laboratory of Power Electronics

The courses related to Power Electronics and Electrical Motor Systems are conducted in the Power Electronics laboratory. Its equipment is also used for the elaboration of diploma theses and for research purposes.

It has 2 fully equipped group workstations on benches, where students can perform a variety of laboratory exercises on all types of electronic power converters. The same workstations can be used to perform laboratory exercises on AC and DC motors using suitable inverters. In addition, a third group work station can be used to perform simple rectifier experiments. The key feature is its modular structure, which allows students to "build" the laboratory experiment themselves, properly connecting the various physical units. In this way, the student can and more easily understand the parts of each circuit, and can understand better the contribution of each to the final operation of the system.

Specifically, the basic equipment of the laboratory includes:

- Semiconductor components (Diodes, diode bridges, thyristors, thyristor bridges, IGBT and their bridges, TRIAC, MOSFET)
- Various AC and DC power supplies, fully controlled (single-phase, three-phase)
- Inverter control units of various types and related controllers
- Complex loads consisting of resistors, coils and capacitors, but also loads with lamps

Isolation amplifier units to assist in obtaining voltage and current measurements and connecting to an oscilloscope

Waveform generator (sinusoidal, square, triangular, etc.)

Modular frequency converter, for experiments with AC drives

Special software for connecting to a computer and performing experiments

Various motors (Asynchronous, annular, DC parallel excitation, etc.)

Electrodynamic brake for simulation of various types of mechanical loads

Various measuring instruments (multimeters, wattmeters, tachometers, etc.)

Color oscilloscopes

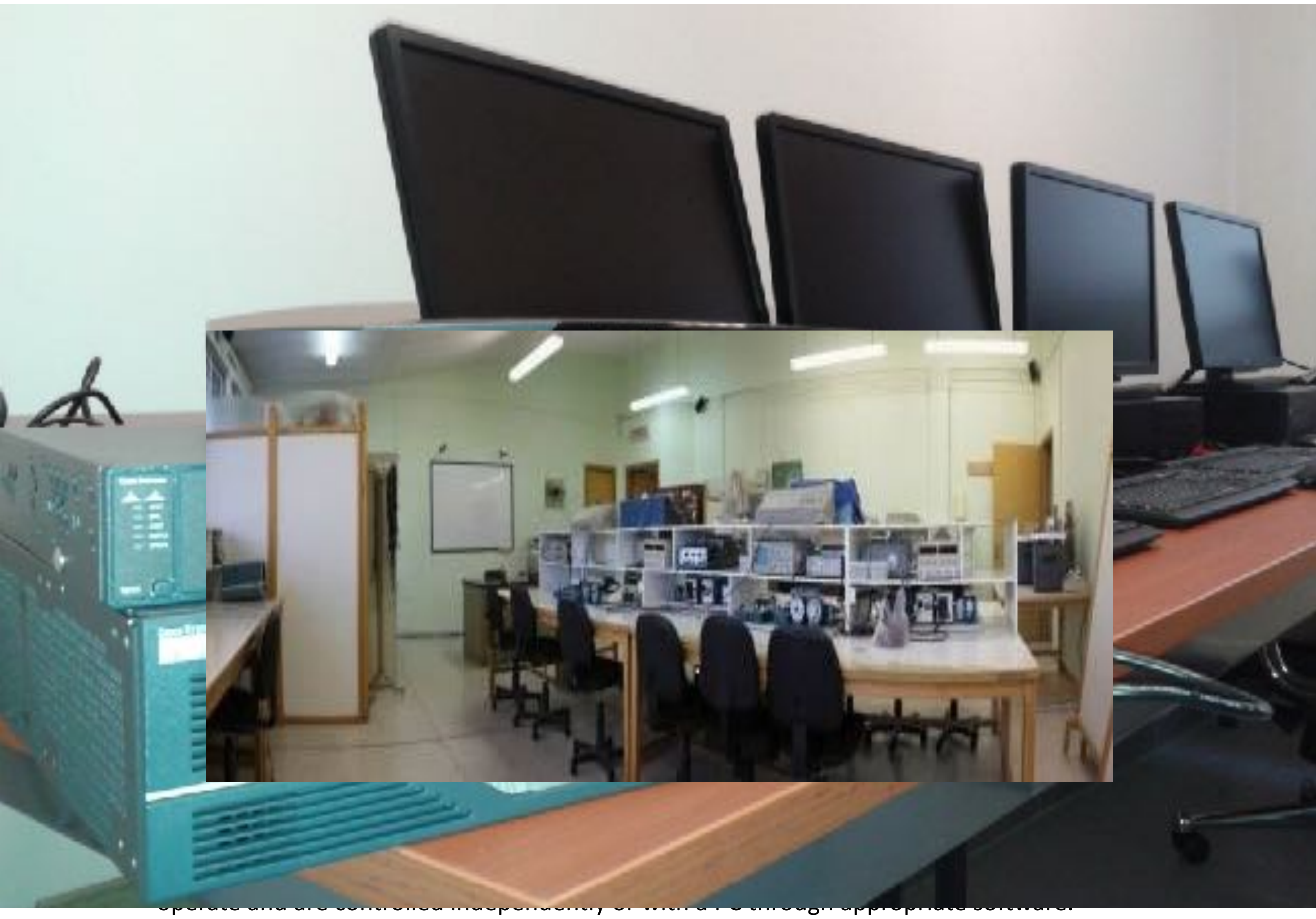
Laboratory of Networks and Advanced Services

The Laboratory of Networks and Advanced Services (LNAS) supports the educational work and the conduct of applied and basic research in the areas of communications networks, computer networks and advanced telecommunications services. Specifically, the Laboratory activities include the design, evaluation, performance analysis, optimization and network management, control and network management in wired and wireless networks, information security, analysis and evaluation of new technologies and protocols, dynamic restructuring networks, design and support of advanced services, adaptation of services and applications over heterogeneous network infrastructures, network energy consumption management and telematics applications.

It possesses five work stations that provide access to modern network devices in switching and routing level. Additionally, it is possible to implement, support and configure wireless point-to-point links, unstructured wireless networks and optical interconnections. The Laboratory also provides a set of servers that offer modern services, including safe switching and routing services, digital telephony, virtual networking, implementation of digital telephone centers and cloud computing services.

In detail, the Laboratory of Networks and Advanced Services provides the following equipment:

- Two Cisco routers (2921 series).
- One Cisco router (2901 series).
- Three Cisco switches (series 2960S).
- Two Cisco switches (series 2960X).
- One Cisco switch (800 series).
- Two MikroTik switches (series CCR1009).
- Four MikroTik switches (series CRS125).
- Six access points 802.11n (various types).
- Two pairs of antennas to create a wireless link.
- Three servers (telephony, security center, visual interface).
- Simulation software of wireless local area (WLAN) networks, radio coverage and spectrum analysis of wireless local area networks simulation, including the 802.11n protocol.
- Application analysis software.



operate and are controlled independently or with a PC through appropriate software.

Specifically, the ACS Laboratory has the following equipment:

- 9 experimental devices MS150 of FEEDBACK, for analog motor control, consisting of an operational amplifier OA 150A, potentiometer unit AU 150B, preamplifier unit PA 150C, servo amplifier SA 150D, power supply PS 150E, output input potentiometer IP 150H LU 150L and voltmeter DC MV 143.
- 9 experimental devices 33-004USB of FEEDBACK, for analog and digital motor control, consisting of the mechanical unit 33-100, the analog unit 33-110, the digital unit 33-120, the power supply 01-100, the appropriate software 93 IMS and 33-921-1V65 eight PCs with Advantech PCI-1751 card.
- 1 experimental device 33-005PCI of FEEDBACK, inverted pendulum, consisting of the mechanical unit 33-200, the controller 33-201, the appropriate software 33-936 and a PC with Advantech PCI-1711 card.
- 1 FEEDBACK 33-007PCI experimental device, dual rotor, consisting of the TRMS mechanical unit, the 33-220 controller, the appropriate 33-949 software and a PC with Advantech PCI-1711 card.
- 9 FEEDBACK signal generators (5 FG601 and 4 FG600).

- 8 dual beam oscillators (1 GOLDSTAR DIGITAL STORAGE OS-3040 40MHz, 2 GOLDSTAR DIGITAL STORAGE OS-3020 20MHz, 1 LG DIGITAL STORAGE OS-3020D 20MHz, 1 LG ANALOG OS-5020 20MHz, 3 HAM / 3 HAM).
- 7 CE 5a analog computers.
- 5 generators generating TTi TG230 2MHz signals.
- 9 DIGITAL Protek 505 multimeters.

LABORATORY OF ELECTRICAL POWER SYSTEMS

The Laboratory of Electric Power Systems covers the educational needs of the Department in the field of electric systems.

In the laboratory, experiments are carried out aiming in the understanding of the basic concepts of electricity transmission and distribution. Through a set of laboratory exercises that include control and fault recognition in a medium voltage mains transformer, in combination with the use of the specialized software DIgSILENT PowerFactory, the student is given the opportunity to acquire practical knowledge of the subject of Electric Power Systems and better understand the corresponding theoretical knowledge.

The laboratory equipment includes transmission line models, long and short, three-phase power supplies, 3-phase 20kV transformers, 3-phase phase change transformer, -phase Power Factory change autotransformer, 3-phase multi-phase transformer, modern machines, static control relays and systems - power analyzers. Specifically, the equipment consists of:

- four (4) models of 77 kV / 136 km long transmission lines
- six (6) variable three-phase inductive loads 2.5 kVAr
- four (4) variable three-phase capacitive loads 2.8 kVAr
- five (5) variable three-phase ohmic loads 3.3 Kw
- two (2) 15kV / 380V three-phase transformers
- three (3) three-phase transformers 220 / 380V 1kV charge angle adjustment
- two (2) 220/380 V charging angle adjustment autotransformers (d) 1kVA
- three (3) three-phase transformers 2kVA 380/127 V (multiple receivers)
- three (3) Terco transformers of 0/20 A voltage
- four (4) MO-1251/20 MHz oscilloscopes
- six (6) electric motors 220V / 2A / 250W / 1500rpm
- six (6) MPR-53 three-phase power analyzers

- two (2) three-phase de Lorenzo power supplies
- two (2) three-phase Elettronica Veneta power supplies
- one (1) three-phase Terco power supply 1300 MV
- panel of static relays Terco
- seven (7) variable resistance potentiometers
- one (1) synchronoscope device - parallelism of electrical networks
- five (5) PC work stations
- one (1) device for measuring dielectric oil resistance 60 kV (meger)

ROBOTICS LABORATORY

The lab possesses up-to-date equipment for the educational and research activities of the Department in the area of Robotics, such as:

- Articulated arm of industrial type.
- Educational configurations for the construction and programming of robotic units.
- Humanoid robots.
- Robots for social assistance applications.
- Robotic platforms of mobile type, for interior applications (e.g., in warehouses), capable of wireless networking, supervision, etc.

Laboratory of Foreign Languages And Terminology

The laboratory is used for teaching Foreign Language / Terminology courses. The laboratory has:

- 20 computer work stations
- Interactive Board
- Projector

USEFUL INFORMATION

INTERNSHIP

The Internship of students of the department started in the academic year 2010-2011 with funding from the **Operational Program for Education and Initial Vocational Training (O.P. "Education")** which is launched by the Ministry of Education and with the cooperation of various companies. Throughout the Internship, the supervisor on behalf of the company and the responsible professor are monitoring the progress of the students and evaluate their performance. During and after the end of the Internship, the student is required to submit reports on the work done in accordance with the rules contained in the Regulation of the University. **The duration of each Internship is three months,** with the possibility of extension**.** Responsible for the Internship of the Department is the Assistant Professor Minas Dasygenis.

ERASMUS PROGRAM

ERASMUS + is the European Commission's new program for education, training, youth and sport, aimed at enhancing skills and employability, as well as modernizing education, training and youth systems in all areas of Lifelong Learning.

Under the ERASMUS + program, students of the Department may spend a period of 3-12 months studying abroad in institutions, with which the University of Western Macedonia has active bilateral agreements. The list of relevant agreements can be found at the following link:

https://erasmus.uowm.gr/bilateral/department/icte/

Studying abroad is fully recognized by the Department of Origin, i.e., the DECE, provided that the student has been successfully tested in the selected courses. Responsible for the ERASMUS + program in the Department is Assistant Professor Stavroula Tavoultzidou.

COURSE CHART OF STUDY PROGRAMME

GENERAL DESCRIPTION

Undergraduate studies in the Department of Electrical and Electronic Engineering of the Polytechnic School of the University of Western Macedonia must include at least ten (10) academic semesters for admission of the Diploma, based on the founding Government Gazette of the Department (Government Gazette AD 192/2005, and renamed Government Gazette AD 70/2019). The courses, necessary for the award of the Diploma correspond to 300 credits, according to ECTS (European Credit Transfer System), which are divided into 30 units per academic semester. Through the model of uninterrupted five-year studies, the Department of Electrical and Electronic Engineering ensures both the foundation of studies in a strong theoretical and technological background, as well as the necessary focus in the individual subjects of the relevant field.

The Curriculum leads to the award of a diploma of "Electrical and Electronic Engineering ", which is a single and inseparable degree of postgraduate level (integrated master), according to the Government Gazette τ.Β '2318 / 2-6-2021.

During the first five academic semesters, the Curriculum includes compulsory courses, which ensure the foundation in basic sciences, as they are an integral part of Electrical and Electronic Engineering studies. Also, the Curriculum includes a series of core courses of the specialty, covering the entire range of cognitive subjects of Electrical and Electronic Engineer. The specific compulsory courses offered are placed in the first six semesters of study and cover its specialty’s individual subjects. A significant number of courses include a compulsory part of laboratory training, which is considered necessary for the formation of a strong technological and scientific background in Engineering studies.

In order for a student to continue his studies in the 7th semester and beyond, it is necessary to have successfully passed at least 20 core courses of the Curriculum, during the first 6 semesters.

From the 7th semester onwards, the Curriculum provides a high level of specialization in three fields of study: a) the Energy division, b) the division of Telecommunications and Networks, and c) the division of Computers and Electronics. In each direction there are mandatory courses and courses of choice for each division, while students can also take courses from other divisions which are generally characterized as optional. Students may choose to do an optional three-month Internship corresponding to 15 ECTS, which is offered as an optional course.

In the last semester of the study program, it is compulsory to deliver a thesis of analytical, experimental, computational or combinatorial character, in the context of which students are invited to develop research activity and study in depth of a specific aspect of science issues of interest to them. The successful completion of the dissertation, under the supervision of a faculty member of the Department, is a necessary, substantial and formal condition for obtaining the diploma of Electrical and Electronic Engineer of the University of Western Macedonia. Any diploma work corresponds to 30 ECTS.

General Learning Outcomes Of The Curriculum

Upon successful completion of the study program, the graduates of the Department have the knowledge, skills and abilities to study, design, analyze, construct, supervise, evaluate, maintain, conduct expertise and provide certification of compliance concerning installations and their applications in the following scientific fields:

a. electricity and power
b. electrical installations and studies
c. computers
d. telecommunications and telecommunications systems and networks
e. information technology and information systems
f. automation, signal processing, image and audio processing systems, speech processing, graphics, etc.

At the same time, the graduate of Electrical and Electronic Engineering department is able to:

a. Identify a problem and choose the best solution after consulting the bibliography
b. Operate and work either independently in the sector or in groups for achieving a common goal
c. Plan and finally execute complex projects that require compliance with strict schedules
d. Generate new ideas in research and apply the knowledge gained innovating in his science
e. Adapt to new situations and be able to deal with them successfully
f. Understand the need for lifelong learning and education and thus meet the requirements of technological developments in his science
g. Follow a doctoral program in a field related to his science
h. Apply his knowledge, skills and abilities taking into account the requirements of social development

Study Program Outline

1st Semester

Course Code	Course Title	Hours per week	ECTS credits
MK1	Mathematical Analysis I	4	5
MK2	Linear Algebra	3	4
MK4-H	Structured Programming	5	5
MKH3	Mechanics	4	4
MK9	Digital Design	4	5
MKH2	Technical Drawing	4	5
MK7	English I (English for Electrical and Computer Engineers)	2	2

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
7	26	30

2nd Semester

Course Code	Course Title	Hours per Week	ECTS Credits
MK8	Mathematical Analysis II	4	5
MK18-H	Electric Circuits I	5	5
MK10	Object Oriented Programming I	4	5
MKH1	Electrical Materials	3	5
MK12	Discrete Mathematics	4	5
MK16	Probability Theory and Statistics	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	24	30

3RD SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK15	Applied Mathematics I	4	5
MKH4	Electrical Measurements	4	5
MK17	Algorithms and Data Structures	4	5
MKH5	Electric Circuits II	5	5
MK6	Introduction to Telecommunications	4	5
E26	Thermodynamics	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	25	30

4TH SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK21	Applied Mathematics II	4	5
MK3	Electromagnetism	4	5
MK23	Signal and System Theory	4	4
MK26-H	Numerical Analysis	4	4
MK25	Electronics I	5	5
MK11	Telecommunication Networks	4	5
MK14	English II (Academic Skills)	2	2

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
7	27	30

5TH SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
MK27	Electromagnetic Waves	4	5
MKH7	Introduction to Electric Power Systems	5	6
MK28	Digital Signal Processing	4	5
MK30	Electronics II	4	5
MK20	Computer Architecture	4	5
MKH8	Techno-economic Analysis	3	4

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	24	30

6TH SEMESTER

Course Code	Course Title	Hours per Week	ECTS Credits
E22	Microprocessors	4	5
MK29-H	Communication Systems	5	5
MK38	Databases	4	5
Y4-H	Automatic Control Systems I	5	5
MK19-H	Computer Networks	4	5
MKH9	Electric Machines I	5	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6	27	30

7TH SEMESTER – ENERGY

Course Code	Course Title	Hours per Week	ECTS Credits
YEH1	Transmission and Distribution Power Systems	4	5
YEH2	Electric Machines II	4	5
YEH3	Power Electronics I	4	5
YEH4	Modern Electrical Installations	4	5
	elective		
	elective		

ELECTIVE COURSES (at least 1)

Course Code	Course Title	Hours per Week	ECTS Credits
Group A - Energy (at least 1 from 4)			
EEH17	Introduction to Nuclear Technology	4	5
EEH2	Lighting	4	5
EEH3	Energy Automation	4	5
EEH4	Heat Transfer	4	5
E27	Operational Research		5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (4 Compulsory - 2 Electives) (at least 1 Elective from DIVISION OF ENERGY and maximum 1 elective of free choice in total during semesters 7-8-9)	24	30

7TH SEMESTER – TELECOMMUNICATIONS AND NETWORKS

Course Code	Course Title	Hours per Week	ECTS Credits
Y2	Analysis and Simulation of Communication Networks	4	5
Y3	Antenna Systems and Wireless Propagation	4	5
E45	Digital Communications	4	5
	elective		
	elective		
	elective		

ELECTIVE COURSES (at least 6 during semesters 7-8-9)

Course	Course Title	Hours per Week	ECTS Credits
Group A (5) - Telecommunications & Networks			
ETH1	Electromagnetic Compatibility	4	5
E2	e-Health	4	5
E9	Queuing Theory	4	5
E48	Mobile and Satellite Communications	4	5
EYH2	Information and Code Theory	4	5
ETH3	Network Programming	4	5
E27	Special Assignment		5
ETH10	Basic Principles of the Internet of Things	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (3 Compulsory - 3 Electives) (at least 6 must be elective from Division of Telecommunications and Networks during semesters 7-8-9 and maximum 1 elective of Free Choice)	24	30

7TH SEMESTER – COMPUTERS & ELECTRONICS

Course Code	Course Title	Hours per Week	ECTS Credits
YYH1	Automatic Control Systems II	5	5

MK22	Operating Systems	4	5
Y1	Artificial Intelligence	4	5
	elective		
	elective		
	elective		

ELECTIVE COURSES (at least 6 during semesters 7-8-9)

Course Code	Course Title	Hours per Week	ECTS Credits
E4	Robotics	4	5
EYH1	Industrial Communications	4	5
E47	Digital Electronics	4	5
E27	Special Assignment	4	5
MK31	Object Orineted Programming II	4	5
E34	Computer Graphics	4	5
EYH2	Information and Code Theory	4	5
E2	e-Health	4	5
EYH8	Data analysis	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (3 Compulsory - 3 Electives) (at least 6 must be elective from Division of Telecommunications and Networks during semesters 7-8-9 and maximum 1 elective of Free Choice)	25	30

7TH SEMESTER – FREE ELECTIVE

Students can recognize up to 1 free choice elective course from those offered in the semesters 7-8-9. If they succeed in the above free elective courses, those will appear in the diploma annex but are not counted in the final degree.

Course Code	Course Title	Hours per Week	ECTS Credits

E7	Technology, Research, Innovation Policies and Entrepreneurship	4	5
E6	Quality Control	4	5
EH2	English III (Academic Writing)	4	5

8TH SEMESTER – ENERGY

DIVISION OF ENERGY ELECTIVE COURSES (at least 4)

Course Code	Course Title	Hours per Week	ECTS Credits
Group A - Energy (at least 4 from 6)			
EEH1	Renewable energy sources	4	5
EEH5	High Voltage Engineering I	4	5
EEH19	Electro-Hydraulic and Electro-Pneumatic Power Systems	4	5
EEH7	Power Electronics II	4	5
EEH20	Special Issues of Electric Power Systems	4	5
EEH14	Modern Electrical Installations and Buildings' Energy Analysis	4	5
EEH10	Energy Economics and Energy Markets	4	5
E27	Special assignment		5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (0 Compulsory - 6 Electives) (At least 4 electives from DIVISION OF ENERGY and maximum 1 elective of free choice in total during semesters 7-8-9)	24	30

8TH SEMESTER – TELECOMMUNICATIONS AND NETWORKS

Course Code	Course Title	Hours per Week	ECTS Credits
Y5	Mobile Communication Networks	4	5
Y6	Optical Communications and Networks	4	5
Y11	Computer and Network Security	4	5
	elective		
	elective		
	elective		

ELECTIVE COURSES

(at least 6 during semesters 7-8-9)

Course Code	Course Title	Hours per Week	ECTS Credits
E14	Wireless Sensor Networks	4	5
E15	Biomedical Technology	4	5
E49	Optics	4	5
E37	Theory and Management of Telecommunication Traffic	4	5
E39	Cloud Computing	4	5
E27	Special Assignment		5
E46	Photonics – Optical Devices	4	5
ETH11	Big Data and Intelligent Applications on the Internet of Things	4	5
EYH6	Machine Learning	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (3 Compulsory - 3 Electives) (at least 6 electives from Division of Telecommunications and Networks during semesters 7-8-9 and maximum 1 elective by Free Choice)	24	30

8TH SEMESTER – COMPUTERS & ELECTRONICS

Course Code	Course Title	Hours per Week	ECTS Credits

MK34	Parallel and Distributed Systems	4	5
MK37	Design and Analysis of Algorithms	4	5
MK33	Software Engineering	4	5
	elective		
	elective		
	elective		

ELECTIVE COURSES (at least 6 during semesters 7-8-9)

Course Code	Course Title	Hours per Week	ECTS Credits
E30	VLSI Design	4	5
E15	Biomedical Technology	4	5
EYH7	Mechatronics	4	5
EYH3	SCADA Systems	4	5
E27	Special Assignment		5
E33	Embedded Systems	4	5
E43	Digital Game Development	4	5
E40	Advanced Databases	4	5
EYH6	Machine Learning	4	5
Y7-H	Human-Computer Interaction	4	5
E39	Cloud Computing	4	5
E44	Geographic Information Systems	4	5
EYH9	Constraint Programming	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (3 Compulsory – 3 Electives) (at least 6 electives from Division of Telecommunications and Networks during semesters 7-8-9 and maximum 1 elective by Free Choice)	24	30

8TH SEMESTER - FREE ELECTIVES

Course Code	Course Title	Hours per Week	ECTS Credits
E38-H	Project Management	4	5
E36	Industrial Management	4	5
EH4	Principles of Management Organization and Decision Making	4	5

9TH SEMESTER – ENERGY

Course Code	Course Title	Hours per Week	ECTS Credits
YEH5	Industrial Electrical Installations	4	5

ELECTIVE COURSES (at least 3)

Course Code	Course Title	Hours per Week	ECTS Credits
Group A - Energy (at least 3 from 6)			
EEH11	Electric Drive Systems	4	5
EEH21	Protection and Stability of Power	4	5
EEH13	Optimization Methods in Electric Power Systems	4	5
EEH15	Introduction to Smart Grids	4	5
EEH16	Energy Storage Technologies	4	5
EEH22	High Voltages II	4	5
EEH23	Special Chapters of Power Electronics	4	5
EEH24	Photovoltaic Systems and Applications	4	5
E27	Special Assignment		5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (1 Compulsory - 3 Electives) (3 Electives from Division of Energy and maximum 1 Elective by Free Choice during semesters 7-8-9)	24	30

9TH SEMESTER – TELECOMMUNICATIONS AND NETWORKS

Course Code	Course Title	Hours per Week	ECTS Credits
Y8	Microwave Communications	4	5
YH2	Design and Operation of Computer Networks	4	5
E35	Management and Optimization Communication Networks	4	5
	elective	4	5
	elective	4	5
	elective	4	5

ELECTIVE COURSES (at least 6 during semesters 7-8-9)

Course Code	Course Title	Hours per Week	ECTS Credits
E3	Next Generation Networks and Services	4	5
E24	Mobile Computing	4	5
E42	Remote Sensing	4	5
E11	Data Mining	4	5
E27	Special Assignment	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (3 Compulsory - 3 Electives) (at least 6 form Division of Telecommunications and Networks during semesters 7-8-9 and maximum 1 elective by free choice)	24	30

9TH SEMESTER – COMPUTERS & ELECTRONICS

Course Code	Course Title	Hours per Week	ECTS Credits
YH2	Design and Operation of Computer Networks	4	5
MK35	Web Programming	4	5
E23	Advanced Issues of Digital Design	4	5
	elective		
	elective		
	elective		

ELECTIVE COURSES (at least 6 during semesters 7-8-9)

Course Code	Course Title	Hours per Week	ECTS Credits
E5	Microtechnology and Nanotechnology	4	5
EYH4	Fuzzy Systems	4	5
E27	Special Assignment		5
MK39	Compilers	4	5
E11	Data Mining	4	5
Y9	Bioinformatics	4	5
E17	Digital Image Processing	4	5
E24	Mobile Computing	4	5
E10	Complexity Theory	4	5

Number of Courses	Teaching Hours (Total)	ECTS Credits (Total)
6 (3 Compulsory - 3 Electives) (at least 6 form Division of Telecommunications and Networks during semesters 7-8-9 and maximum 1 elective by free choice)	24	30

9TH SEMESTER – FREE ELECTIVES

Course Code	Course Title	Hours per Week	ECTS Credits

EH6	Non-Destructive Testing	4	5
E41	Informatics and Education	4	5

OPTIONAL COURSES

Students can declare, attend, be examined and secure the optional courses offered by the Department, without however being counted for obtaining the diploma or the calculation of the final grade. In case of successful attendance, the course is listed in the diploma annex, as well as the workload (ECTS credits) corresponding to each.

EH5	Research work methodologies	2	2
E12	Internship	-	15

10TH SEMESTER

The 10th semester is devoted to the elaboration of a diploma thesis, which is equivalent to 30 ECTS credits.

DIPLOMA THESIS WRITING REGULATION

The Diploma Thesis (DT) is written by all students in the final year of their studies. The successful accomplishment of the DT, under the supervision of TRS (Teaching and Research Staff) members of the department, consists an essential, substantial and formal requirement for obtaining the diploma of Electrical and Computer Engineering of the University of Western Macedonia. Each DT is drafted individually or by two students.

In case it is prepared by two students, two separate theses should be submitted, and each one of them should be graded separately. The thesis regulation is available in the following link: Diploma -Thesis Writing Regulation.

Undertaking a DT

Students have the right to undertake a DT after completing the first 8 semesters of their studies and if the number of ECTS credits of the courses they owe does not exceed 50 ECTS. This number does not include the courses of the 9th semester.

Purpose of DT

The DT enables students to demonstrate their skills in concluding independent topics of Electrical and Computer Engineering. In addition, it represents an opportunity to practice and enrich their knowledge in Computer Science and Telecommunications, as well as their advanced applications. Through DT, students acquire and cultivate additional skills that will be brought into play in their future professional path. DT can combine some of the following characteristics:

- Research profile that may lead to new results, which are considered worthy of publication in scientific conferences and journals.
- Exploring new technologies and participation in development projects.
- Interdepartmental projects developed in collaboration with TRS) members of other departments.

Selection criteria

Supervising teachers can use the following criteria before assigning a DT:

- Score in the courses related to the content of the DT.
- Average score.

In addition, supervisors have the right to refuse the assignment of a DT.

Dissertation examination and marking

The Dissertation is examined by the supervising professor and two additional co-examiners relevant to the subject of the DT. The average mark of the three examiners results in the final score of the Dissertation.

Dissertation presentation

The candidate graduates make a public presentation of their DTs during a day conference organized by the Department.

Process of DT Assignment

The assignment procedure is done during the course registration period. Each TRS member may announce at least two Dissertation subjects. Each TRS member is also the supervisor of the subject proposed and one of the examiners. The topics are posted on the website of the Department or on the personal pages of its members.

Students who undertake a DT have to submit to the Administration Office a document, signed by the supervisor/s that enables the title of the DT and the name of the supervising professor.

In case the student decides to change the subject and supervisor, he must first inform the previous supervisor and then make a new application for withdrawal in the period to be announced by the Secretariat. At least one academic semester must have elapsed between two consecutive DT statements of the same student.

The successfully completed DTs, are submitted to the Administration Office on announced dates.

ADDITIONAL INFORMATION

Final Exams

The exams are conducted exclusively after the end of the winter and spring semesters for the courses taught in those semesters, respectively. The student is entitled to be examined in the courses of both semesters before the beginning of the winter semester. The grade in each course is determined by the teacher, who can organize at his discretion written or oral exams or based on assignments or laboratory exercises.

Examination and evaluation / grading regulations

The grade scale with which students' performance scores are calculated is a ten-point system (0-10), with a minimum promotional grade of 5.

- Excellent: 8.50-10.00.
- Very Good: 6.50- 8.49.
- Good: 5.00-6.49.
- Fail: 0.00-4.99

Admission to one of the three Divisions

In order for a student to be admitted in a division of his / her choice, he / she must have previously successfully passed at least 20 courses in the first 6 semesters. A change of direction is allowed up to 3 times in total, at the request of the student concerned, during the course statements at the beginning of each semester.

Official duration of the program

The studies in the Department of Electrical and Computer Engineering are five years of full-time study and the workload corresponds to 300 ECTS credits. A full academic year corresponds to 60 ECTS credits and each full academic semester corresponds to 30 ECTS credits. Each course is assigned the number of ECTS credits, which expresses the required workload (workload is the time calculated that a student typically needs to devote to completing all the learning activities required to achieve the expected learning outcomes).

COURSES DESCRIPTION

1ST SEMESTER

MATHEMATICAL ANALYSIS I

COURSE UNIT CODE	MK1
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	1st
YEAR OF STUDIES	1st
SEMESTER	1st
ECTS CREDITS	5
COURSE WEBSITE (URL)	eclass.uowm.gr/courses/ICTE108/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bisbas A.
COURSE CONTENTS	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.
LEARNING OUTCOMES / GENERAL COMPETENCES	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	-
TEACHING METHODS	Lectures, exercises
ASSESSMENT METHODS	Written intermediate exam (25%), written final exam (75%).

LANGUAGE OF INSTRUCTION/EXAMS	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. H. Anton, I. Bivens, S. Davis, *Calculus – Early Transcendentals* (9^{th} ed), John Wiley & Sons, 2009.

Linear Algebra

COURSE UNIT CODE	MK2
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	1st
YEAR OF STUDIES	1^{st}
SEMESTER	1^{st}
ECTS CREDITS	4
COURSE WEBSITE (URL)	eclass.uowm.gr/courses/ICTE307/
TEACHING WEEKLY HOURS	3)
INSTRUCTOR	Bisbas A.
COURSE CONTENTS	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.
LEARNING OUTCOMES / GENERAL COMPETENCES	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	-
TEACHING METHODS	Lectures, exercises
ASSESSMENT METHODS	Written final exam (100%)

LANGUAGE OF INSTRUCTION/EXAMS	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. Richard C., Penney, *Linear Algebra*, John Wiley and Sons Ltd, 1998.

STRUCTURED PROGRAMMING

COURSE UNIT CODE	MK4-H
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	1st
SEMESTER	1st
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE110/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Stergiou K.
COURSE CONTENTS	1. Introductory Concepts. Programming Languages. Algorithms 2. Running Algorithms and Compilers 3. Programming Methodology. Design and Evaluation 4. Introduction to the C programming language 5. Data Types, Constants and Variables 6. Commands, Basic decision structures (if, switch), loop structures (while do while, for) 7. Tables, String, Multi-Dimensional Tables 8. Pointers, Pointers and Tables 9. Functions, Parameters, Parameter Passing, Value and Reference-based 10. Scope and Duration of Variables 11. Structures, Tables of Structures 12. Dynamic memory assignment, Dynamic Tables 13. File management

LEARNING OUTCOMES / GENERAL COMPETENCES	The course is the main introductory course on computer programming, one of the most basic skills that electrical and computer engineers should possess. The course material aims at introducing students to the basic concepts of programming as well as algorithmic thinking using the widely used language C. The expected learning outcomes are the following: 1. Understanding the principles of algorithm design 2. Gaining experience in designing algorithms for simple and complex problems 3. Knowledge of programming principles with the C language (data types, variables, constants) 4. Knowledge of the basic components of structured programming languages such as C (loops, tables, strings, functions, aggregate types, files) 5. Knowledge of advanced specific characteristics of C (pointers, pointers and tables, passage of parameters using pointers) 6. Gaining experience in writing and debugging programs 7. Understanding and implementing basic algorithms (search, sorting) 8. Gaining experience and understanding software technology principles 9. Experience in collaborative problem solving Upon successful completion of the course, students will: 10. know how to design simple algorithms 11. understand the basics of structured programming 12. know how to write, compile, and debug programs in C 13. are capable of writing programs in C using loops, tables, functions, pointers, structures, and files 14. have a basic knowledge of software technology
PREREQUISITES	-
TEACHING METHODS	Face to face

ASSESSMENT METHODS	The evaluation is done through: • written examination at the end of the semester that includes short answer questions and resolution of exercises • scoring the code of laboratory exercises carried out during the semester • laboratory examination at the end of the semester The evaluation criteria are as follows: • correctness • clarity • accuracy • efficiency
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Αλέξανδρος Καράκος, Εισαγωγή στη γλώσσα C, με παρα-δείγματα και ασκήσεις, ΚΑΡΑΚΟΣ ΣΠΥΡΙΔΩΝ, Έκδοση: 2/2012. 2. Ν. Χατζηγιαννάκης, Η γλώσσα C σε βάθος, Κλειδάριθμος, 2009 3. Kernighan, Ritchie, Η ΓΛΩΣΣΑ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΥ C, Κλειδάριθμος, 2008 4. Σεφερίδης, C για Αρχάριους, Κλειδάριθμος, 2009 - Recommended Article/Paper Resources: ACM Transactions on Programming Languages and Systems, Journal of Computer Languages

MECHANICS

COURSE UNIT CODE	MKH3
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	UNDERGRADUATE
YEAR OF STUDIES	1st
SEMESTER	1st
ECTS CREDITS	4
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE379/
TEACHING WEEKLY HOURS	**4**
INSTRUCTOR	Fillipidis K.
COURSE CONTENTS	Interactions and Motion The Momentum Principle and Impulse The Fundamental Interactions Contact Interactions Determining Motion from Forces Determining Forces from Motion The Energy Principle and Work Translational, Rotational, and Vibrational Energy Gravity Oscillations Collisions Angular Momentum, Torque and Rigid Body Dynamics Waves

LEARNING OUTCOMES / GENERAL COMPETENCES	Deduce from observations of an object’s motion whether or not it has interacted with its surroundings. Mathematically describe position, motion, momentum and change of momentum in three dimensions. Read and modify a simple computational model of motion at constant velocity. Use both iterative and analytical techniques (differential equations solving) to predict the future motion of a system that is subjected to a constant or varying net force. Use an iterative approach to predict the future momentum and motion of an object that is subjected to a varying net force when it cannot be solved analytically. Draw and interpret graphs of the components of position or velocity vs. time. Calculate the force exerted by a spring on an object in contact with it. Calculate the approximate gravitational force on an object near the Earth’s surface. Calculate the 3D gravitational or electric force exerted on a system by objects in its surroundings. Iteratively predict the motion of an object that interacts gravitationally or electrically with its surroundings, by hand or with a computer. Analyze simple collisions by applying the Momentum Principle to a system of more than one particle. Using the ball–spring model, explain in words how an inanimate object can exert a force on an object that touches it. Mathematically describe the motion of an object that interacts with a spring, both analytically and computationally (iteratively). Identify systematically all the forces acting on a system. Determine the values of unknown 3D forces acting on a system whose motion is known. Analyze curving motion mathematically, and relate parallel and perpendicular components of $d\vec{p}/dt$ to the net force acting on the system. Calculate the total energy (rest energy + kinetic energy) of a single particle system. Calculate the total energy of a multiparticle system (rest energy, kinetic energy, and gravitational and electric potential energy). Mathematically relate changes in energy of a system to the work done by the surroundings. Analyze in detail processes involving changes in potential energy, kinetic energy, and rest energy. Construct and interpret graphs of multiparticle system energy as a

PREREQUISITES	-
TEACHING METHODS	Lectures
ASSESSMENT METHODS	Evaluation takes place in Greek and if need in English by final written examination on four problems. Optionally the students can build up their grade by taking part in a midterm examination (multiple choice test) and by submitting two VPython projects. Samples of examination items are posted on the-class and e-assessment platforms.
LANGUAGE OF INSTRUCTION/EXAMS	Greek (also possible in English)
RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. Physics for scientists and engineers, RAYMOND A. SERWAY, JOHN W. JEWETT 2. University Physics, Young H., Freedman R. 3. Basic Principles of Physics, R. SHANKAR 4. Matter and Interactions, RUTH W. CHABAY, BRUCE A. SHERWOOD - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: 1. The Physics Teacher (published by AIP on behalf of the AAPT) 2. American Journal of Physics (published by AIP on behalf of the AAPT) 3. European Journal of Physics (published by IOP on behalf of the EPS) - Recommended Websites and YouTube channels: • Glowscript.org • Let’s Code Physics • Physics Explained

DIGITAL DESIGN

COURSE UNIT CODE	MK9
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	1^{st}
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE358/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Asimopoulos N.
COURSE CONTENTS	The purpose of this course is to provide to the students a detailed knowledge of the basic hardware elements of computer systems. Specifically, starting from the basic concepts of binary logic and logic circuits, students shall learn to use the building blocks of digital systems, as well as design and analyze both combinational and sequential digital circuits. In depth, digital design course deals with the following: • Binary numbers and arithmetic • Logic gates and standards symbolism • Basic concepts of logic circuits • Boole Algebra, logic functions and simplification methods, digital circuits synthesis and analysis • Combinational circuits • Binary Adder, half adder, full adder, parallel adder and subtractor circuits • Comparator , Decoder - Encoder circuits • Demultiplexer, Multiplexer circuits • Programmable logical arrays • Analysis and design of synchronous/asynchronous sequential circuits • Introduction to VHDL • Exercises

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the digital design course, students shall attain familiarity with a broad range of digital circuits. That is, combinational and sequential digital circuits and computer systems' integrated circuits and shall thoroughly understand the principles and disciplines for robust digital logic and digital systems' design.
PREREQUISITES	-
TEACHING METHODS	Lectures, Practical exercises, Laboratory exercises
ASSESSMENT METHODS	Written exam (100%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	[1] Βιβλίο [22701978]: Ψηφιακή Σχεδίαση, Ρουμελιώτης Μάνος, Σουραβλάς Στάυρος Ψηφιακή Σχεδίαση Κωδικός Βιβλίου στον Εύδοξο: 22701978 Έκδοση: 1η Έκδοση/2012 Συγγραφείς: Ρουμελιώτης Μάνος, Σουραβλάς Στάυρος ISBN: 978-960-418-388-3 Τύπος: Σύγγραμμα Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε. [2] Βιβλίο [41963432]: Ψηφιακή Σχεδίαση, Morris Mano, Michael Ciletti Κωδικός Βιβλίου στον Εύδοξο: 41963432 Έκδοση: 5η Έκδοση/2013 Συγγραφείς: Morris Mano, Michael Ciletti ISBN: 978-960-491-084-7 Τύπος: Σύγγραμμα Διαθέτης (Εκδότης): ΠΑΠΑΣΩΤΗΡΙΟΥ Α.Ε.

TECHNICAL DRAWING

COURSE UNIT CODE	MKH2
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	1ο
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE352/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Stimoniaris D.
COURSE CONTENTS	• Introduction to technical and electrical design. Regulations, legislation • Conventional design and study of electrical circuits • Introduction and configuration of EPLAN software package • Creation and designing of a project • Set screw terminals, cables and materials (libraries) • Definition and management of materials, cables, with databases of companies • Documentation and export a full project feasibility analysis
LEARNING OUTCOMES / GENERAL COMPETENCES	This course provides the basic knowledge for planning and design documentation for electrical and electronic circuits and their application to electrical energy networks using Computers and specialized software designer packages. On successful completion of this module the student will be able to: • have the theoretical and practical background for designing electric circuits • apply suitable rules and standards for an electrical design • use appropriately software packages for designing circuits on a PC
PREREQUISITES	-
TEACHING METHODS	Lectures, Individual Study, e-class platform support, Software package exercise

ASSESSMENT METHODS	- Type: Laboratory (50%) - Date of exams: Weekly B) - Type: Exams (50%) - Exams on PC - Date: End of the semester
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. ELWE: Training systems for basic and future oriented education in natural science and engineering 2. German Schematic Diagrams of Industrial Equipment SIEMENS 3. Manual EPLAN, Dimitriadis Chr.- Gougousi Maria-G. Papanastasis. 4. www.eplan.gr

ENGLISH I-ENGLISH FOR ELECTRICAL AND COMPUTER ENGINEERING

COURSE UNIT CODE	MK7
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	UNDERGRADUATE
YEAR OF STUDIES	1st
SEMESTER	1st
ECTS CREDITS	2
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE355/
TEACHING WEEKLY HOURS	**2**
INSTRUCTOR	Tavoultzidou S.
COURSE CONTENTS	Electrical and Computer Engineering Energy Conversion Energy Conversion Devices Electric Power Systems Renewable Sources Semiconductors Integrated Circuits Telecommunications Robotics and Artificial Intelligence Computer History Computer Generations Software Operating Systems Programming languages

LEARNING OUTCOMES / GENERAL COMPETENCES	The course aims to qualify students with: • developing reading strategies to reading comprehension of authentic academic discipline-based texts. • identifying and applying grammatical structures and Electrical and Computer Engineering lexis. • drawing inferences regarding their mother tongue (Greek) and English language on grammar, lexis, and discourse elements. • producing simple academic discourse (reports, descriptions, instructions, etc.) • interpreting and analysing information in diagrams, tables, etc. The course focuses on teaching ESP/EAP with a view to enabling students to: • meet their career needs, i.e., working as Electrical and Computer Engineers in a national, international, or interdisciplinary environment • take part in various European Programmes (Erasmus+, etc.) • attend postgraduate studies • develop linguistic and intercultural awareness

PREREQUISITES	-
TEACHING METHODS	• Face-to face • Synchronous distance learning (zoom), if required
ASSESSMENT METHODS	• End-semester exams test (60%) • Mid-semester test (40%) Assessment exercises: • Multiple choice questions • TRUE-FALSE questions • Word Building (Nouns/Adjectives) • Grammatical structures • Synonyms-Antonyms • Vocabulary Expansion (prefix-es/suffixes/difficult plural forms/differences between AmE-BrE) • Short academic and technical texts production of reference and paraphrasing
LANGUAGE OF INSTRUCTION/EXAMS	English

RECOMMENDED BIBLIOGRAPHY	1. Balari-Petrianidi, I. (2016), English for Electrical and Computer Engineering, New Technologies Publications, Athens 2. Peppa, I. (2016), English for Electronics Engineering, Disigma Publications, Athens

2ND SEMESTER

MATHEMATICAL ANALYSIS II

COURSE UNIT CODE	MK8
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	2nd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY119/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bisbas A.
COURSE CONTENTS	The $\mathbb{R}^n$ 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.
LEARNING OUTCOMES / GENERAL COMPETENCES	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 intermediate exam (25%), written final exam (75%)

LANGUAGE OF INSTRUCTION/EXAMS	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.

ELECTRIC CIRCUITS I

COURSE UNIT CODE	MK18-H
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	1st
SEMESTER	2nd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE373/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Poulakis N.
COURSE CONTENTS	1. Electrical quantities and circuit elements: International System of Units (SI), voltage and current, power and energy, voltage and current sources, electrical resistance (Ohm's law), Kirchhoff's laws, analysis of a circuit that contains dependent sources. 2. Simple ohmic elements: Resistors in series and parallel, voltage divider circuits, voltage and current measurement, resistance measurement–Wheatstone bridge, equivalence of triangle with star circuits (Δ-to-Y). 3. Techniques for circuit analysis: Method of voltage nodes with independent and/or dependent sources and special cases, method of current loops with independent and/or dependent sources and special cases, comparison of the two methods. 4. Self-inductance, capacitance: Series and parallel combinations of inductances and capacitances, mutual inductance. 5. First order circuits RL and RC: Natural and step response, the general solution for step and natural responses, Sequential Switches. 6. Natural and step response of RLC circuits: Natural response of parallel RLC circuit, response formats, sub-, normal and hyper-damping, step response of parallel RLC circuit, natural and step response of series RLC circuit.

LEARNING OUTCOMES / GENERAL COMPETENCES	At successful end of the course the student will be able to: •understand, use and convert SI and empirical units in electric circuits, •calculate the power for every element of a simple circuit, •recognize series or parallel connections of resistors and calculate the total resistance, •use voltage divider and current divider to solve simple circuits, •analyze a Wheatstone bridge and use it to measure an unknown resistance, •use Δ – Y transformation to solve simple circuits, •use the method of voltage nodes and the method of current loops to solve a circuit, •judge which method is preferable for each circuit, •understand the source transformation and be able to use it for solving a circuit, •understand the meaning of and be able to solve the equivalent Thevenin and Norton circuits of a complex circuit, •understand and estimate the value of the load which satisfies the condition for maximum power transfer, •know and be able to use the equations for the voltage, current, power and energy in an inductive coil or a capacitor as well as in parallel or serial combinations of such, •understand of the concept of the mutual inductance and be able to use the dot convention to form the current loop equations for a circuit that contains magnetically coupled coils, •calculate the transitional response of RL and RC circuits as well as their response in step excitation, •be able to analyze a circuit with successive switching function, •calculate the transitional response and the response to step excitation of parallel and series RLC circuits. General competencies: •Analysis and synthesis of data and information concerning electric circuits by the use of appropriate technologies •Individual/Independent work.

PREREQUISITES	-
TEACHING METHODS	Theory Lectures (2 hours/week) Tutorial exercises (1 hours/week) Laboratory exercises (2 hours/week)

ASSESSMENT METHODS	• Three written progress exams (25%) •Final written problem-solving exam (35%) •Weekly laboratory assessments with final writ-ten report (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Nilsson/Riedel "ELECTRIC CIRCUITS" 9th Edition, ISBN-10:0-13-611499-7, Pearson Education 2. Papadopoulos K. "Analysis of Electric circuits" 2nd Edition, Testator (Publisher): TSOTRAS AN ATHANASIOS 3. Alexander C., Sadiku M. "Electric circuits" 6th Edition, ISBN 978-0-07-802822-9, McGraw-Hill Education

Object Oriented Programming I

COURSE UNIT CODE	MK10
COURSE UNIT TYPE	Specific Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	2nd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE209/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bibi S.

COURSE CONTENTS	The course introduces students to the concepts related to Object Oriented programming, aiming to learn the most popular object-oriented programming language, Java. Students will come in contact with concepts such as subtraction, polymorphism, and see how they are implemented through heredity, content, and interfaces. The course deals with stream and file management, code debugging techniques and dynamic data set management. Students will be trained in the use of threads in order to create multi-threaded applications. Students will also gain hands-on experience in using the above concepts through their involvement with the Java programming language, both through a series of laboratory courses and through programming assignments. Course modules: • Section 1: Introduction to Object Oriented Programming, Basic Concepts, Types and Generations of Programming Languages, Java (History, Versions, Technologies, Advantages) • Section 2: Java Code Development, the first program, operators, control commands, iteration structures, input-output commands, basic libraries / packages, IDE environments • Section 3: Classes & Objects, Implementing Classes and Objects in Java, Designing Classes, Member Data, Member Functions, Constructors, Data Access Types, Definition and Use of Objects • Section 4: Classes & Objects, modifiers, get, set, toString functions, const, static, overload mechanism, string management • Section 5: Data Sets, One-Dimensional and Two-Dimensional Tables, Arraylists, Access mechanisms, Iterators • Section 6: Composition, objects as data members of classes, how to handle objects, examples of composition • Section 7: Inheritance, implementation of class hierarchy, superclasses, subclasses, override of functions, comparison between inheritance and composition • Section 8: Polymorphism, Abstract Classes, Dynamic and Static Binding, Data Type Conversion, Examples of Polymorphism • Section 9: Interfaces, scope, objectives, "multiple" inheritance • Section 10: Exceptions, Exception Management, Hierarchy, Chain Exceptions, Defining new Exception, Error management. • Section 11: Graphical User Interface, Introduction to Swing Library, Graphical Components, Colors, Fonts, Shapes, Event Managers, Listeners

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course students will be able to: Understand in depth the principles of Object-Oriented Programming. Design and implement object-oriented applications. Understand in-depth the concepts of encapsulation, polymorphism and inheritance. Implement classes with their members and methods and create objects. Understand and use abstract classes. Understand the use and operation of arrays, strings, and collections in Java. Design and develop simple and complex applications with Java language. Design and develop graphical user interfaces with Java language. Understand in-depth the exception mechanism supported by Java and define new exceptions. Understand the concept of parallel programming by using threads. Recognize code errors and have the ability to correct them. Evaluate solutions and choose the most appropriate one to apply to real problems.
PREREQUISITES	-
TEACHING METHODS	Face- to- face

ASSESSMENT METHODS	The evaluation of students is carried out with: • Written evaluation • Laboratory examination • Application Development (Teamwork) The written evaluation is intended to examine the students' knowledge of the taught material and to capture the degree of its assimilation. Includes multiple choice questions, free questions but also short answers, code evaluation, code development. The purpose of the laboratory exams is to determine the degree of students' familiarity when designing and developing Java applications in limited time. It includes short application development in Java language. The teamwork includes application development in Java into teams of two persons. The applications implemented in Java are submitted electronically in the e-class platform. The final evaluation of the students is as follows: 60% Grade of written examination + 20% Grade of teamwork + 20% Grade of laboratory examination
LANGUAGE OF INSTRUCTION/	Greek
RECOMMENDED BIBLIOGRAPHY	**Books (in Greek)** 1. Savitch Walter, Absolute Java (contains CD), Pearson. 2. Deitel Paul J., Deitel Harvey M., Java how to program, Prentice Hall 3. H. Schildt,. Java A Begginner's Guide, McGraw-Hill Osborne Media. 4. E. Lervik and VB Havdal, Java the UML way, Wiley. 5. R. Cadenhead and L. Lemay, Java 7, Sams Publishing. **Journals** Science of Computer programming, Elsevier Journal of Systems and Software, Elsevier Proceedings of the ACM on Programming Languages, ACM

ELECTRICAL MATERIALS

COURSE UNIT CODE	MKH1
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	2nd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE350/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Poulakis N.
COURSE CONTENTS	1. Atomic structure, atomic bonds and type of solids 2. Molecular kinetic theory, thermal expansion, heat and thermal noise 3. Crystal state, crystal types and defects 4. Classical theory for the electrical and thermal conductivity: Drude model, dependence of the special resistivity on temperature, electrical conductivity in non-ideal metals and alloys 5. Thermal conductivity in metals, thermal resistance 6. Electrical conductivity in non-metallic materials 7. AC conductivity.
LEARNING OUTCOMES / GENERAL COMPETENCES	With successful completion of the course, students will be able to • understand the macroscopic properties (mechanical, thermal, electrical, and magnetic) of the basic materials of the modern technological applications, based on their microstructure, ionic or crystal, • comprehend phase diagrams both qualitatively and quantitatively, • comprehend curves of electric and magnetic quantities, and • mathematically extract the values of the basic physical quantities of materials. General competencies: • Search for, analysis and synthesis of data and information using appropriate technologies • Understanding of the basic physical properties of materials on the basis of their microscopic structure

PREREQUISITES	-
TEACHING METHODS	Face to face
ASSESSMENT METHODS	• A midterm written progress exam (25%) • Final written problem-solving exam (75%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Kasap S. O. “Electrotechnical materials” 4th Edition, ISBN 9390113865, McGraw Hill 2. Callister W. D. “Materials Science and Engineering”, 9th ed., John Wiley & Sons 3. Spyrou Nikolaos S. “Conductive properties of electrotechnical materials” 4th Edition, A. Tziola & Sons Ltd Publications

COURSE UNIT CODE	MK12
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	2nd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE350/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Ploskas N.
COURSE CONTENTS	• Logic and Proofs. • Finite and Infinite Sets. • Computability. • Formal Languages and Grammars. • Permutations. • Combinations and Discrete Probability. • Relations and Functions. • Graphs and Trees. • Finite State Machines. • Discrete Numeric Functions and Generating Functions. • Algorithms and Complexity. • Recursive Relations.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will: • understand methods for solving discrete mathematical problems • apply solution methods to unknown problems • developing problem-solving skills and creative thinking • understand the basics of set theory • understand the basics of computability • understand the basics of formal languages and grammars • be able to calculate permutations and computations • be able to solve basic problems in graphs and trees • be able to study discrete numeric functions • understand the basics of algorithmic complexity • be able to calculate recursive functions General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Decision-making • Individual/Independent work • Algorithmic thinking • Solve complex algorithmic problems

PREREQUISITES	-
TEACHING METHODS	Face to face
ASSESSMENT METHODS	The assessment method consists of two intermediate written examinations (20%) and a final written examination (80%). The intermediate and final examinations include multiple choice questions, short answer questions, and problem-solving questions. The above evaluation criteria are posted on the course website.
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. Rosen Kenneth H., Διακριτά μαθηματικά και εφαρμογές τους, Εκδόσεις Α. Τζιόλα, Έκδοση: 8η/2018 2. Lipschutz Seymour, Lipson Marc Lars, Διακριτά μαθηματικά, Εκδόσεις Α. Τζιόλα, Έκδοση: 2η έκδ./2003 3. Liu C.L., Στοιχεία διακριτών μαθηματικών, Πανεπιστημιακές Εκδόσεις Κρήτης, Έκδοση: 1η/2009 - Related Scientific Journals: 4. Discrete Mathematics 5. SIAM Journal on Discrete Mathematics 6. Discrete Mathematics and Applications

PROBABILITY THEORY AND STATISTICS

COURSE UNIT CODE	MK16
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	1st
SEMESTER	2nd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY116/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bisbas A.
COURSE CONTENTS	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.
LEARNING OUTCOMES / GENERAL COMPETENCES	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	Mathematical Analysis
TEACHING METHODS	Lectures, Hours of Instruction 52 (Theory: 26, Exercises: 26)
ASSESSMENT METHODS	Final written exam (compulsory), Intermediate written exam and/ or assignments (optional)
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Statistics, D. P. Psoinos. Zitis Publ., 1999. 2. Probability and Statistics for Engineers, G. Ch. Zioutas, Zitis Publ., 2013.

3RD SEMESTER

COURSE UNIT CODE	MK15
COURSE UNIT TYPE	General background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	3rd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE109/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Zygiridis T.
COURSE CONTENTS	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.

LEARNING OUTCOMES / GENERAL COMPETENCES	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. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies. • Decision-making. • Individual/Independent work.

PREREQUISITES	Elements of the following courses are required: • Mathematical Analysis I • Mathematical Analysis II • Linear Algebra
TEACHING METHODS	- Face-to-face - Online synchronous (if necessary)
ASSESSMENT METHODS	Summative mid-term written assessment (25%) and summative final written assessment (75%) in Greek. The adequacy of theoretical knowledge, the ability to apply specific methodologies and the ability to solve problems under specific time constraints are tested. The evaluation criteria refer to the validity of the answers, as well as to the degree of their clarity and completeness. Oral exams are provided for students with learning difficulties. The criteria can be accessed by students via the platform eclass.uowm.gr.
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. W. E. Boyce R. C. Diprima, Στοιχειώδεις Διαφορικές Εξισώσεις & Προβλήματα Συνοριακών Τιμών, ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ, Έκδοση: 2η/2015. 2. Θ. Ρασσιάς, Μαθηματικά ΙΙ β έκδοση, ΤΣΟΤΡΑΣ ΑΝ ΑΘΑΝΑΣΙΟΣ, Έκδοση: 2η/2017. 3. Τραχανάς Στέφανος, Συνήθεις Διαφορικές Εξισώσεις, ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2008. 4. Κάρολος Σεραφειμίδης, Διαφορικές Εξισώσεις, Εκδόσεις "σοφία", 2010. 5. ΝΙΚΟΛΑΟΣ Μ. ΣΤΑΥΡΑΚΑΚΗΣ, Διαφορικές Εξισώσεις: Συνήθεις και Μερικές. Θεωρία και Εφαρμογές από τη Φύση και τη Ζωή, ΤΣΟΤΡΑΣ ΑΝ ΑΘΑΝΑΣΙΟΣ, Έκδοση: 2η/2017. 6. Μυλωνάς Νίκος, Σχοινάς Χρήστος, Διαφορικές Εξισώσεις, Μετασχηματισμοί και Μιγαδικές Συναρτήσεις, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, Έκδοση: 1η/2015. 7. Κραββαρίτης Δ., Εισαγωγή στις Διαφορικές εξισώσεις, ΤΣΟΤΡΑΣ ΑΝ ΑΘΑΝΑΣΙΟΣ, Έκδοση: 1η/2014. 8. David Logan, J., A First Course in Differential Equations [electronic resource], Heal-Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. 9. Soare, Mircea V. Teodorescu, Petre P. Toma, Ileana, Ordinary Differential Equations with Applications to Mechanics [electronic resource], Heal Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

ELECTRICAL MEASUREMENTS

COURSE UNIT CODE	MKH4
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	3rd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE351
TEACHING WEEKLY HOURS	**4**
INSTRUCTOR	Poulakis N.
COURSE CONTENTS	1. Systems of units: International System (SI) and Anglo-Saxon System of units, measurement standards, electrical measurement standards. 2. Theory of errors: Measurements, errors, accuracy, methods for the calculation of errors, uncertainties, metrology. 3. Measurement Instruments: Classification, static and dynamic instrument characteristics, analog and digital instruments, typical instruments for electrical measurements. 4. Measurement setups and measurement systems: Capacitors and inductors with losses, ammeters and voltmeters in measurement setups, voltage dividers, measurement transformers. 5. Measurement bridges and balance methods: DC and AC bridges. 6. Power and energy measurement in DC and AC circuits, power measurement in single- and three phase circuits. 7. Static and dynamic sensor characteristics 8. Sensor signal conditioning 9. Electro-mechanical sensors of position, displacement, force, mechanical voltage 10. Temperature sensors

LEARNING OUTCOMES / GENERAL COMPETENCES	At successful completion of the course, student will: • be able to process measurement data, estimate errors and present the results with correct statistics • know the basic operating principles and structure of electrical measurement instruments, with emphasis on the modern digital instruments and the differences with the traditional analogue ones (advantages-disadvantages) • know the basic electrical measurement setups, the techniques and the elements used for measurements in the full range of electrical power • be able to analyze the basic bridge circuits and calculate their output voltage • be familiar with the operation of digital instruments for electrical measurements, be able to select the optimum sampling characteristics according to the sensitivity and spectral resolution sought in each application, • understand the characteristics of the basic types of voltage/ current waveforms and be able to measure them • be able to assess the value of the static and dynamic characteristics of the common transducers used to measure physical quantities be able to use the basic circuits and techniques of supply and signal processing of electromechanical temperature, and light sensors. General Competences: • Search for, analysis and synthesis of data and information using appropriate technologies,

PREREQUISITES	Electrical Circuits I Electrical Circuits II Discrete Mathematics
TEACHING METHODS	• Face to face theory lectures (2h/week) • Individual laboratory practice (2h/week)
ASSESSMENT METHODS	• Final written exam in measuring circuits design and analysis and uncertainty estimation problems (70%) • 6 laboratory assessments leading to final written reports (30%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. “Handbook of Modern Sensor: Physics, Design, and Applications”, Jacob Fraden, 3rd ed., 2004 Springer, ISBN:0-387-00750-4. Handbook of Modern Sensors | SpringerLink 2. “Sensor Technology Handbook”, editor Jan S. Wilson, 2005 Newnes, ISBN:0-7506-7729-5. Sensor Technology Handbook 3. “Transducers and Their Elements: Design and Application”,

ALGORITHMS AND DATA STRUCTURES

COURSE UNIT CODE	MKH17
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	3rd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE267/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Ploskas N.
COURSE CONTENTS	• Abstract Data Types • Compound Data Structures. • Arrays, Pointers, Linked Lists. • Stacks, Queues. • Algorithms and Complexity. • Recursive Algorithms. • Searching and Sorting Algorithms. • Graphs and Trees. • Search Trees. • Priority Queues. • Heap. • Hashing. • Programming in C.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will: • analyze and compare the efficiency of algorithms in terms of their theoretical complexity • use, develop and extend the data structures arrays, lists, queues, stacks and trees and understand their applications • apply the algorithms that will studied in this course to unknown problems • select and/or develop appropriate data structures and algorithms for implementing abstract data types • design and implement efficient solutions in complex computational problems • understand and implement sorting algorithms • use various hashing techniques for data storage • handle basic functions in priority queues General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Decision-making • Individual/Independent work • Algorithmic thinking • Solve complex algorithmic problems

PREREQUISITES	-
TEACHING METHODS	• Face to face
ASSESSMENT METHODS	• The language of evaluation is Greek. The assessment method consists of an intermediate written examination (10%), three assignments (30%) and a final written examination (60%). The intermediate and final examinations include multiple choice questions, short answer questions, and problem-solving questions. The three assignments require the implementation of algorithms in the C programming language. • The above evaluation criteria are posted on the course website.
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. Robert Sedgewick, Αλγόριθμοι σε C, μέρη 1 – 4: θεμελιώδεις έννοιες, δομές δεδομένων, ταξινόμηση, αναζήτηση, Εκδόσεις Κλειδάριθμος, Έκδοση: 3η αμερικάνικη έκδοση, 1η ελληνική έκδοση/2005 2. Sahnii Sartaj, Δομές δεδομένων, αλγόριθμοι και εφαρμογές σε C++, Εκδόσεις Τζιόλα, Έκδοση: 1η/2004 3. Παναγιώτης Μποζάνης, Δομές δεδομένων, Εκδόσεις Τζιόλα, Έκδοση: 2η/2016 4. Γεώργιος Γεωργακόπουλος, Δομές δεδομένων, Πανεπιστημιακές Εκδόσεις Κρήτης, Έκδοση: 2η/2002 Related Scientific Journals: 5. Algorithmica 6. Journal of Algorithms 7. ACM Transactions on Algorithms

ELECTRICAL CIRCUITS II

COURSE UNIT CODE	MKH5
COURSE UNIT TYPE	Compulsory/Elective
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	3rd
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE354/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Tsiamitros D.
COURSE CONTENTS	• Electric parameters definition in sinusoidal alternating current during steady-state operation – Voltage and current representation as a function of time. • Electric parameters representation as phasors. • R, L, C in AC current. Voltage-current phasors representation. • Impedance, series and shunt circuits analysis. • Typical AC current circuits analysis • AC power and power triangles. • Power factor correction – Compensation in single-phase circuits. • Resonance, Comparison with power factor correction. • Three-phase circuits, Y and D connections, AC power in three-phase systems. • Power factor correction in three-phase circuits. • Magnetic-coupled circuits, Ideal transformers and mutual inductance. •Laplace and Fourier transform. •Frequency response and filters

LEARNING OUTCOMES / GENERAL COMPETENCES	On successful completion of this module the learner will be able to: 1. Understand, analyze and design simple ac circuits. 2. Know the basic power and energy formulas. 3. Make power factor correction in new or old one-phase installations. 4. Understand and analyze three-phase circuits. 5. Make power factor correction in new or old three-phase installations. 6. Understand and analyze resonance circuits. 7. Understand and analyze magnetic-coupled circuits.
PREREQUISITES	Electric Circuits I, Mathematical Analysis I and II
TEACHING METHODS	Lectures, Problems solving in class, Laboratory exercises, Homework-study
ASSESSMENT METHODS	Final examination (70%) including: - Multiple choice questions - Questions needing development - Problems solving, intermediate exams, Laboratory exercises (30%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Σημειώσεις στην Ηλεκτροτεχνία II, ΤΕΙ Δυτικής Μακεδονίας, 2009, επιμέλεια: Δημήτριος Τσιαμήτρος, διαθέσιμο και ηλεκτρονικά στο eclass.teikoz.gr. 2. Ηλεκτροτεχνία. 2ος Τόμος, Κωδικός Βιβλίου στον Εύδοξο: 14608, Έκδοση: 1η έκδ./2007, Συγγραφείς: Τουλόγλου Στέφανος, ISBN: 978-960-405-183-0, Διαθέτης (Εκδότης): ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ ΟΕ 3. ΗΛΕΚΤΡΟΤΕΧΝΙΑ II, Κωδικός Βιβλίου στον Εύδοξο: 2104, Έκδοση: ΠΡΩΤΗ, Συγγραφείς: ΓΚΑΡΟΥΤΣΟΣ ΓΙΑΝΝΗΣ, ISBN: 960-8250-31-5, Διαθέτης (Εκδότης):ΓΚΑΡΟΥΤΣΟΣ ΙΩΑΝΝΗΣ-ΨΑΡΡΑ ΑΝΑΣΤΑΣΙΑ Ο.Ε

INTRODUCTION TO TELECOMMUNICATIONS

COURSE UNIT CODE	MK6
COURSE UNIT TYPE	Compulsory/ Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	3rd
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE172/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Louta M.
COURSE CONTENTS	History of Telecommunications. Telecommunications Systems Model. Information Transmission Techniques. Bandwidth & Spectrum. Channel Capacity. Synchronous & Asynchronous Transmission. Modulation and Coding. Transmission Media. Multiplexing. Noise. Error Detection and Management. Retransmission Techniques. Introduction to Telecommunication Networks. Network Classification. Network Design and Layered Architecture. OSI Reference Model. General principles on network management.
LEARNING OUTCOMES/ GENERAL COMPETENCES	The course objective is the comprehension and learning of the basic principles of communications, data networking and communication protocols. Specifically, the telecommunication systems model and the layered protocol architecture are presented in detail (OSI reference model, TCP/IP protocol stack). Emphasis is given on the first two layers (Physical, Data Link).
PREREQUISITES	-
TEACHING METHODS	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. Exercises are solved.
ASSESSMENT METHODS	Course assessment is conducted by written exams taking place at the middle and the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30% and 70%, respectively).

LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. William Stallings, *Επικοινωνίες Υπολογιστών και Δεδομένων*, 8η Έκδοση, 2011, Εκδόσεις Τζιόλα. 2. Α. Αλεξόπουλος και Γ. Λαγογιάννης, *Τηλεπικοινωνίες και Δίκτυα Υπολογιστών*, 8η Έκδοση, 2012, Εκδ. Παπασωτηρίου.

THERMODYNAMICS

COURSE UNIT CODE	MK7
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	3rd
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/MECH261/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Florini

COURSE CONTENTS

Thermodynamics course consists of the following sections:

- Introduction - Basic concepts and definitions (thermodynamics, systems, statutory equations, pressure, temperature, thermodynamic process, mechanical work, energy, heat, reversibility).
- The first Thermodynamic Law of energy conservation (internal energy, enthalpy, work, closed systems, permanent flow processes).
- The second Thermodynamic Law of energy quality degradation (entropy and thermodynamic equilibrium, heat reversibility engines, heat pumps, perfect gas entropy, ideal Carnot cycle for ideal gas, application to energy conversion processes).
- Mathematical foundation of Thermodynamics (total differential and static functions, trans-formation relations, Legendre transformations, basic property relations for PVT systems of variable composition and heat capacities for PVT systems of fixed composition, equilibrium in closed heterogeneous systems).
- Third Thermodynamic Law (absolute zero, ideal crystal entropy, consequences of the 3rd law).
- Ideal gases and mixtures of gases and gases-vapors (ideal gases, ideal mixtures of gases, gas-vapor mixtures, liquid air). Thermodynamic analysis of constant flow processes (work, energy, flow processes, mixing processes, project processes).
- Air power generation cycles (internal combustion engines, Carnot, Otto, Diesel, Diesotto, Brayton-Joule, Stirling, Ericson) and steam.
- Thermodynamic cycles of steam power generation (Rankine, with regeneration / reheating), cogeneration and combined cycles.
- Thermodynamics of power plants with air and steam heat and combustion (conversion of chemical and nuclear energy into work and electricity production, work on steam, improvements, work on gas).
- Thermodynamic analysis of processes according to the 2nd Thermodynamic Law (reversible process work, energy not convertible into work, exergy, extermination destruction, entropy production)
- Thermodynamics of cooling and liquefaction (heating and cooling as basic thermodynamic problems, cooling production methods, Carnot cooling cycle, refrigeration cycle with vapor compression and absorption, gasification cycles of gas, heat

LEARNING OUTCOMES / GENERAL COMPETENCES	After the successful completion of the Heat Transfer course the student would be able to: • Comprehend the basics of the Thermodynamics and know their definitions • Comprehend and explain Thermodynamic Laws, basic thermodynamic processes, energy balance, entropy, exergy, entropy production • Calculate thermodynamic parameters and solve thermodynamic problems employing statutory equations, thermodynamic laws applying mathematics. • Assess various fluid processes (open and closed systems) • Develop thermodynamic processes (thermodynamic cycles) concerning air power production (Carnot, Otto, Diesel, Diesotto, Brayton-Joule, Stirling, Ericson), steam power production (Rankine), co-production and combined thermodynamic cycles • Comprehend cooling production cycles (ideal and real gas compression via adsorption of liquefication process), heat pumps After the successful completion of the Heat Transfer course the student would develop: • Ability of searching, analyzing and synthesizing raw data and processing information applying appropriate technology tools • Ability of criticism and self-criticism • Ability to promote liberal, creative and inductive thinking

PREREQUISITES	Mathematics I, Mathematics II, Physics
TEACHING METHODS	• Face – to – face education • Simultaneous distance education
ASSESSMENT METHODS	• Final written examination: 70 % • Mid – term examination: 30 %
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. “Introduction to Thermodynamics”, J. M. Smith, H. Van Ness, M. M. Abbott, 2011 2. “Thermodynamics, Introduction in basic and fundamental applications”, Hans Dieter Baehr, 2011 3. “Thermodynamics: An Engineering Approach” 8th Edition, Yunus Cengel, Michael Boles, 2014

4TH SEMESTER

APPLIED MATHEMATICS II

COURSE UNIT CODE	MK21
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	UNDERGRADUATE
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE217/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Zygiridis T.
COURSE CONTENTS	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.
LEARNING OUTCOMES / GENERAL COMPETENCES	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. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies. • Decision-making. • Individual/Independent work.

PREREQUISITES	Elements of the following courses are required: • Linear Algebra • Mathematical Analysis II • Applied Mathematics I
TEACHING METHODS	• Face-to-face • Online synchronous (if necessary)
ASSESSMENT METHODS	Summative mid-term written assessment (25%) and summative final written assessment (75%) in Greek. The adequacy of theoretical knowledge, the ability to apply specific methodologies and the ability to solve problems under specific time constraints are tested. The evaluation criteria refer to the validity of the answers, as well as to the degree of their clarity and completeness. Oral exams are provided for students with learning difficulties. The criteria can be accessed by students via the platform eclass.uowm.gr.
LANGUAGE OF INSTRUCTION/EXAMS	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. Richard Haberman, ΕΦΑΡΜΟΣΜΕΝΕΣ ΜΕΡΙΚΕΣ ΔΙΑΦΟΡΙΚΕΣ ΕΞΙΣΩΣΕΙΣ, ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, 2014. 4. Κυβεντίδης Θωμάς, Μερικές διαφορικές εξισώσεις, Ζήτη , 2009. 5. ΝΙΚΟΛΑΟΣ Μ. ΣΤΑΥΡΑΚΑΚΗΣ, Μερικές Διαφορικές Εξισώσεις. Μιγαδικές Συναρτήσεις: Θεωρία και Εφαρμογές, ΝΙΚΟΛΑΟΣ ΣΤΑΥΡΑΚΑΚΗΣ ΜΙΧΑΗΛ, Έκδοση: 1η/2016. 6. Tveito, Aslak. Golubitsky, M.Jager, W.Marsden, J.E. Sirovich, L. Winther, Ragnar, Introduction to Partial Differential Equations [electronic resource], Heal Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. 7. Myint U, Tyn.Debnath, Lokenath, Linear Partial Differential Equations for Scientists and Engineers [electronic resource], Heal Link/Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

ELECTROMAGNETISM

COURSE UNIT CODE	MK3
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	UNDERGRADUATE
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE364/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Zigiridis T.
COURSE CONTENTS	Electrostatic field: point and distributed electric charges φορτία, Coulomb's law, electric-field intensity, scalar electric potential, dielectric displacement, Gauss law, boundary conditions. Conductors, capacitors, capacitance. Dielectric polarization. The method of images. Fields due to constant electric currents: current intensity, current density, Ohm's law, electric resistance, Joule's law, grounding systems. Magnetostatic field: Ampere's law, vector magnetic potential, Biot-Savart law, magnetic flex, self-inductance, forces on wires. Electromagnetic induction, Faraday's law.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able: • to describe the sources of static electric and magnetic fields and understand the physical significance of the pertinent quantities, • to compute the electric-field intensity, generated by point or distributed charges, • to understand the interaction between electric fields and conductors, • to calculate the capacitance of different configurations and the resistance of conducting objects, • to understand the behavior of simple grounding elements, • to calculate the magnetic-field intensity due to known current distributions, • to calculate the induced voltages on conductors and the applied forces on current-carrying wires. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies. • Decision-making. • Individual/Independent work.

PREREQUISITES	Elements of the following courses are required: • Mathematical Analysis II
TEACHING METHODS	• - Face-to-face • - Online synchronous (if necessary)
ASSESSMENT METHODS	Summative mid-term written assessment (25%) and summative final written assessment (75%) in Greek. The adequacy of theoretical knowledge, the ability to apply specific methodologies and the ability to solve problems under specific time constraints are tested. The evaluation criteria refer to the validity of the answers, as well as to the degree of their clarity and completeness. Oral exams are provided for stu-dents with learning difficulties. The criteria can be accessed by students via the platform eclass.uowm.gr.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. ΤΣΙΜΠΟΥΚΗΣ Δ. ΘΕΟΔΩΡΟΣ, ΗΛΕΚΤΡΟΜΑΓΝΗΤΙΚΟ ΠΕΔΙΟ (ενιαίος τόμος), ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ & ΕΡΕΥΝΑΣ-ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, Έκδοση: 1η/2014 2. Ρουμελιώτης Ι.-Τσαλαμέγκας Ι., Ηλεκτρομαγνητικά Πεδία, τόμος Β΄, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., Έκδοση: 1η έκδ./2010. 3. GRIFFITHS J. DAVID, ΕΙΣΑΓΩΓΗ ΣΤΗΝ ΗΛΕΚΤΡΟΔΥΝΑΜΙΚΗ (ΣΕ ΕΝΑΝ ΤΟΜΟ), ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ & ΕΡΕΥΝΑΣ-ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, Έκδοση: 1η/2012. 4. RAYMOND A. SERWAY, JOHN W. JEWETT, ΦΥΣΙΚΗ ΓΙΑ ΕΠΙΣΤΗΜΟΝΕΣ ΚΑΙ ΜΗΧΑΝΙΚΟΥΣ: ΗΛΕΚΤΡΙΣΜΟΣ ΚΑΙ ΜΑΓΝΗΤΙΣΜΟΣ, ΦΩΣ ΚΑΙ ΟΠΤΙΚΗ, ΣΥΓΧΡΟΝΗ ΦΥΣΙΚΗ, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, Έκδοση: 8η Αμερικανική/2013.

Signal And System Theory

COURSE UNIT CODE	MK23
COURSE UNIT TYPE	Specialized Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	4
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE234/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Tsipouras M.
COURSE CONTENTS	Signal and system classification. Elementary signals. Generalized functions. Linear time invariant systems. Convolution. Impulse response. Fourier transform and series. Frequency response. Laplace transform. Transfer functions. Stability. Sampling. Filters.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able: • to classify signals and systems based on their properties, • to compute convolutions, • to describe signals using transform / series Fourier, • to apply Laplace transform, • to manage generalized functions, • to study the stability of linear systems • to compute system response, • to determine the effect of filters on signals, • to apply the sampling theorem and describe the connection signal continuous and discrete time.
PREREQUISITES	-
TEACHING METHODS	Lectures, theoretical exercises, development exercises
ASSESSMENT METHODS	Two mandatory exercises (30%) Final written examination (70%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Θεοδωρίδης Σ., Μπερμπερίδης Κ., Κοφίδης Λ., *Εισαγωγή στη θεωρία σημάτων και συστημάτων*, Γ. Δαρδανος 2003. 2. Oppenheim, Willsky, Nawab, *Σηματα Και Συστηματα*, Γρηγοριος Χρυσοστομου Φουντας, 2011. 3. Θεόδωρος Αλεξόπουλος, *Εισαγωγη Στην Αναλυση Σηματος*, Πανεπιστημιακές, Εκδόσεις Εμπ, 2011.

NUMERICAL ANALYSIS

COURSE UNIT CODE	MK26-H
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	4
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE300/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Tsipouras M.
COURSE CONTENTS	• Introduction to Numerical Analysis, Numerical Systems, Representation of Numbers, Conversions, Floating – point numbers, Errors, Absolute and relative error, Propagation of uncertainty, Accuracy. • Linear Systems, Linear System Solving, Cramer's Rule, Gauss Method, Gauss – Jordan Method, Thomas' algorithm, LU decomposition, Cholesky decomposition • Iterative Methods for Solving Linear Systems, Convergence Conditions, Jacobi method, Gauss – Seidel method. • Solving nonlinear equations and systems, Roots of nonlinear equations, Long Division, Bisection method, Newton Raphson method, Intersection method, Nonlinear System Solving. • Numerical integration, Rectangle method, Simpson's 1/3 rule, Simpson's 3/8 rule, Composite functions. • Interpolation and Extrapolation, Numerical Approach, Polynomial interpolation, Lagrange polynomial, Newton polynomial, Least squares. • Solving first order linear differential equations, Euler Method, Runge – Kutta Method.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able: • to understand the basic arithmetic methods. • to estimate the advantages and disadvantages of the methods. • to distinguish the differences between the methods in order to choose the most appropriate one for the problem they are called to solve. • to design and develop mathematical modeling and numerical analysis algorithms. • to compose and / or use appropriate software to implement the required application. • to explain the results of different methods based on absolute and relative errors. • to evaluate and compare Numerical Analysis methods. • to judge the appropriateness of each arithmetic method in specific problems.
PREREQUISITES	Mathematical Analysis I, II, Applied Mathematics I, Introduction to Structured Programming
TEACHING METHODS	Face to face Distance learning
ASSESSMENT METHODS	Assessment methods: Two mandatory sets of assignments (30%) and a final written exam (70%). Assessment criteria: They are explicitly mentioned in the first lesson and are announced on the course website.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Sarris I.- Karakasidis Th., Numerical Methods and Applications for Engineers, A. TZIOLA PUBLICATIONS, Edition: 4th/ 2019. 2. Papageorgiou G. Tsitouras Ch., Numerical Analysis with applications in MATHEMATICA and MATLAB, TSOTRAS AN ATHANASIOS, Edition: 1st / 2015. 3. Chapra S. - Canale R., Numerical Methods for Engineers, A. TZIOLA PUBLICATIONS, Edition: 7th / 2016. 4. AKRIVIS GD, DOUGALIS BA, INTRODUCTION TO NUMERICAL ANALYSIS, UNIVERSITY EDITION. CRETE, Edition: 4th / 2015.

ELECTRONICS I

COURSE UNIT CODE	MK25
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE366/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Gavros K.

COURSE CONTENTS

THEORETICAL PART

Ch 1: Semiconductors
1.1 Energy bands
1.2 N-type and P-type semiconductors
1.3 Semiconducting elements

Ch 2: Semiconductor diodes
2.1 The pn junction
2.2 Biasing a pn junction
2.3 Voltage-current characteristic curve of a diode
2.4 Diode models, barrier potential, dynamic resistance
2.5 dc diode resistance
2.6 Temperature effects
2.7 Diode datasheet information: power rating and pick inverse voltage

Ch 3: Special purpose diodes
3.1 LED
3.2 Zener diodes
3.3 The zener voltage and load regulator

Ch 4: Diode applications
4.1 The half-wave rectifier
4.2 The full-wave rectifier
4.3 The capacitor filter
4.4 Voltage and load regulation
4.5 Limiters

Ch 5: Bipolar Junction Transistors (BJT)
5.1 BJT structure
5.2 Forward-inverse bias
5.3 The common emitter (CE) connection
5.4 Base bias
5.5 Voltage divider bias
5.6 Other types of bias
5.7 Troubleshooting

Ch 6: The CE amplifier
6.1 DC and AC models
6.2 AC resistance of the emitter
6.3 The CE amplifier analysis (voltage gain)
6.4 Emitter resistance elimination
6.5 Multi-stage amplifiers

LABORATORY PART
Assignment 1: The diode curve

LEARNING OUTCOMES / GENERAL COMPETENCES	«Electronics I» is the first part of a two-semester curses. It is dedicated to the principles of analog electronic circuits. Starting with the atomic structure of semiconductors, the syllabus continues with the main characteristics of the pn junction, diode biasing and characteristics, the main rectifier circuits, and power supply filters and regulators. It also contains elements of the Bipolar Junction Transistor (BJT) structure, BJT bias circuits and their function as small signal amplifiers and switches. Electric circuit design and analysis is based on theoretical calculations assisted by a powerful computer simulating tool, MultiSimÒ. On successful completion of this module the learner will be able to: • Explain how to bias a diode and describe its IV characteristic curve. • Design and analyze the operation of three basic rectifier circuits: half-wave rectifier, center-tapped and bridge full wave rectifier. • Describe the function of power supply filters and regulators. • Describe the three types of BJT bias circuits: base, voltage divider and emitter. • Design and analyze the operation of a BJT as a small signal amplifier. • Use a BJT in a switching circuit. General Competences: • Analysis and synthesis of data using proper mathematical tools and simulation software

PREREQUISITES	-
TEACHING METHODS	Face-to-face

ASSESSMENT METHODS	The grade of the course theory derives from the grade of the written examination as well as that of the possible progress exams. The grade of the course laboratory is that of the final exam (Project), in which the quality of the delivered assignments is taken into account qualitatively. The final grade of the course is calculated indicatively based on the following equation. Final grade = 0.75 (Theory grade) +0.25 (laboratory grade), if (THEORY grade) ≥ 5.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. 1. Albert P. Malvino, «Βασική Ηλεκτρονική», 4η έκδ./2007, ISBN: 978-960-7219-12-0, Εκδ. ΤΖΙΟΛΑ, Κωδικός βιβλίου «ΕΥΔΟΞΟΣ»: 18549034. 2. 2. Thomas L. Floyd, «Ηλεκτρονικά Στοιχεία», 1η έκδ./2014, ISBN: 0-13-238351-9, ΕΚΔΟΤΙΚΟΣ ΟΜΙΛΟΣ ΙΩΝ 3. 3. Γ. Χαριτάντης, «Εισαγωγή στα Ηλεκτρονικά», 2006, ISBN: 978-960-91034-6-6, Εκδ. ΔΕΜΕΡΝΤΖΗΣ ΠΑΝΤΕΛΗΣ, Κωδικός βιβλίου «ΕΥΔΟΞΟΣ»: 2139. 4. 4. Thomas L. Floyd & David M. Buchla, «The Science of Electronics», 2005, Prentice Hal

TELECOMMUNICATION NETWORKS

COURSE UNIT CODE	MK11
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE203/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Louta M.
COURSE CONTENTS	Overview of networking technologies. Switching principles and techniques. Circuit and Packet Switching. Routing. Traffic and congestion control. Access networks. X-DSL Technologies, X.25, Frame Relay, ATM. Telephone Network. Mobile Communication Networks. Synchronous Digital Hierarchy. Signaling systems. Common Channel Signaling No. 7 (CCS7). Call and Service Control. Intelligent Networks. Quality of Service (QoS). Telecommunication Traffic Modeling. Network Management.
LEARNING OUTCOMES / GENERAL COMPETENCES	The course objective is the comprehension and learning of the various networking technologies. In this context, a wide range of issues are addressed, aiming to cover telecommunication networks and techniques for network design, development, management and evaluation.
PREREQUISITES	-
TEACHING METHODS	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. Exercises are solved. Additionally, laboratorial exercises are carried out with the help of simulation programs.
ASSESSMENT METHODS	Course assessment is conducted by written exams taking place at the middle and the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30% and 70%, respectively).

LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Α. Αλεξόπουλος και Γ. Λαγογιάννης, "Τηλεπικοινωνίες και Δίκτυα Υπολογιστών", 8η Έκδοση, 2012, Εκδ. Παπασωτηρίου. 5. Ιάκωβος Βενιέρης, "Δίκτυα Ευρείας Ζώνης", 3η Έκδοση, 2012, Εκδόσεις Τζιόλα.

COURSE UNIT CODE	MK14
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	2nd
SEMESTER	4th
ECTS CREDITS	2
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE382/
TEACHING WEEKLY HOURS	**2**
INSTRUCTOR	Tavoultzidou S.
COURSE CONTENTS	• Curriculum Vitae (English CV, Resume, Europass) • Cover Letter • Statement of purpose (Personal Statement) • Correspondence (Application Letters. Etc.) • Power Point Presentations in English • Compound Words & Academic Collocations • Research paper component parts • Writing the Abstract of a research paper • Referencing/ Bibliography styles (APA, MLA, Chicago, IEEE etc) • Citing/Referencing bibliographic sources

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course students will be able to: • compose a Curriculum Vitae/Resume • write the Cover Letter of a CV/ Resume • write Application Letters, Job or Postgraduate Studies related • write a Personal Statement for a scholarship • make a Power Point presentation in English • make a Pecha Kucha presentation in English • create a Poster for a conference • know the process of writing a research paper • write the abstract of a research paper • use the different citation styles (APA, MLA, Chicago, IEEE etc) • apply the different ways of recording bibliography and reference sources The main concern of the course is to enhance students' language skills required to meet: • their needs as Electrical and Computer Engineering students at undergraduate level • their needs regarding postgraduate studies, European Programmes (Erasmus+, etc.) • their career pursuits as electrical and computer engineers, as well as academic researchers

PREREQUISITES	-
TEACHING METHODS	• Face-to face • Synchronous distance learning (zoom), if required
ASSESSMENT METHODS	• End-semester exams test (60%) • Mid-semester test (20%) • Project (20%)
LANGUAGE OF INSTRUCTION/EXAMS	English

RECOMMENDED BIBLIOGRAPHY	1. Integrating Technical & Academic Writing into your English Course - Theory and Practice - Κωδ. Βιβλίου Εύδοξο: 86199178 Έκδοση: 1η/2019, Συγγραφείς: E. Panourgia 2. University Writing Course Student's Book with answers, Κωδ. Βιβλίου στον Εύδοξο: 10686, Έκδοση: 1η έκδ./2007, Morley John ,Doyle Peter,Pople Ian 3. Ακαδημαϊκή Γραφή, Κωδ. Βιβλίου στον Εύδοξο: 68391268, Έκδοση: 3η/2017, Ευδωρίδου Έλσα -Καρακασίδης Θόδωρος

5TH SEMESTER

Electromagnetic Waves

COURSE UNIT CODE	MK27
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	5th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE174/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Zygiridis T.
COURSE CONTENTS	Time-varying fields, displacement current, Maxwell's equations, wave equation, retarded potentials, Poynting vector. Plane waves, polarization, propagation. Reflection and transmission. Transmission lines, TEM waves, telegrapher's equations. Waveguides, TE and TM modes, dielectric waveguides. Electromagnetic radiation and antennas, short dipole, half-wavelength dipole, antenna arrays, radiation pattern.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able: • to recognize the differences between static and time-varying fields, • to determine the electric-field using the magnetic-field intensity, and vice versa, • to use complex representations of electromagnetic quantities, • to understand the properties and behavior of electromagnetic fields, • to know the impact of propagation media on wave properties, • to solve simple problems involving reflection and transmission of waves, • to solve problems pertinent to transmission lines, using circuit models, • to determine the characteristics of waveguide structures that fulfil certain constraints, • to study the properties of simple antennas. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies. • Decision-making. • Individual/Independent work.

PREREQUISITES	Elements of the following courses are required: • Electromagnetism • Mathematical Analysis II
TEACHING METHODS	• Face-to-face • Online synchronous (if necessary)

ASSESSMENT METHODS	Summative mid-term written assessment (25%) and summative final written assessment (75%) in Greek. The adequacy of theoretical knowledge, the ability to apply specific methodologies and the ability to solve problems under specific time constraints are tested. The evaluation criteria refer to the validity of the answers, as well as to the degree of their clarity and completeness. Oral exams are provided for students with learning difficulties. The criteria can be accessed by students via the platform eclass.uowm.gr.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Τσιμπούκης Δ. Θεόδωρος, Ηλεκτρομαγνητικό Πεδίο, Πανεπιστημιακές Εκδόσεις Κρήτης, 2014. 2. Shen Liang Chi, Kong Jin Au, Εφαρμοσμένος Ηλεκτρομαγνητισμός, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ, 2007 3. Kraus John D., Ηλεκτρομαγνητισμός, Εκδόσεις Α. Τζιόλα & Υιοί, 2011. 4. Τσαλαμέγκας Ιωάννης Λ., Ρουμελιώτης Ιωάννης Α., Ηλεκτρομαγνητικά πεδία, τόμος Α΄, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ, Έκδοση: 1η έκδ./2010. 5. DAVID CHENG, ΗΛΕΚΤΡΟΜΑΓΝΗΤΙΚΑ ΠΕΔΙΑ ΚΑΙ ΚΥΜΑΤΑ, ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, Έκδοση: 1/2013.

COURSE UNIT CODE	MKH7
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	5th
ECTS CREDITS	6
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE353/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Christoforidis G.

COURSE CONTENTS	The course consists of the following main topics: i. Introduction in electric Power Systems (Week 1) • Historical background of the evolution and structure of Electric Power Generation, Transmission and Distribution • The Greek Electric Power System: components, structure, special features • Electricity billing and Energy Markets • Basic operating characteristics of a Power System ii. Basic Concepts (Weeks 2 and 3) • Phasors • Symmetric 3-phase circuits and equivalent models • Power flow calculation • Symmetric component analysis • Per-unit system. iii. Power plants (Weeks 4 and 5) • Thermal power plants – thermal processes and power flow • Gas turbines-combined cycle • Hydroelectric power plant • Renewable Energy Sources • Other kind of technologies iv. Synchronous generators (Weeks 6-8) • Types of modern synchronous generators, main features • Modeling, parameters, equivalent circuits • Steady state and transient operation • Active-reactive power control and voltage control • Generator synchronization on the grid • Power balance and losses v. Power Transformers (Weeks 9-11) • 1-phase and 3-phase transformers, equivalent circuits, structural characteristics, losses • Open-circuit and short-circuit experiments • Types of transformers (power, current and voltage, 3-winding, auto transformer) • Winding connection of 3-phase transformers • Parallel connection and voltage control vi. Lines and cables (both overhead and underground) of transmission and distribution grid (Weeks 12 and 13) • Introduction, electrical parameters • Equivalent model of short lines

LEARNING OUTCOMES / GENERAL COMPETENCES	After successfully completing this course, students will be able to: • recognize the basic elements that compose a power system and understand its operation • analyze and perform per-unit calculations on a power system • describe and analyze the power generation procedure in power plants • compare and evaluate various kinds of power production plants (different types and technologies) • understand and analyze the operation of synchronous generators connected to the grid • understand and analyze the operation of power transformers under different winding connections know the electrical characteristics of power lines and cables and apply the short-line model for power flow analysis
PREREQUISITES	-
TEACHING METHODS	- Lectures (PowerPoint slides via projections) and tutorials - Learning process support via e-class platform - Laboratory exercises
ASSESSMENT METHODS	- Laboratory project assignments (30%) - Final exams (70 %)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek-English
RECOMMENDED BIBLIOGRAPHY	1. D. Labridis, P. Dokopoulos, G. Papagiannis, Electrical Power Systems, Ziti publications, Code Eudoxos 11294. 2. N. Vovos, G. Giannakopoulos, Introduction to Electric Power Systems, Ziti publications, Code Eudoxos 11248. 3. Vournas Constantinos, Kontaxis G., Introduction to Electric Power Systems, Code Eudoxos 45429.

DIGITAL SIGNAL PROCESSING

COURSE UNIT CODE	MK28
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3^{rd}
SEMESTER	5^{th}
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE113/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Tsipouras M.

COURSE CONTENTS	• Introductory Concepts, Continuous and Discrete Signals, Analog to Digital Converting, Sampling, Nyquist / Shannon Theorem, Quantum, Coding • Discrete Time Signals, Discrete Time Signal Properties, Independent Variable Transformations, Dependent Variable Transformations, Signal Characteristics. • Introduction to Discrete Time Systems, Classification of DT Systems, LTI Systems Analysis Techniques, Convolution Method, Directs Methods for Solving Difference Equations, The Convolution Theorem, Properties of Convolution, Convolution Calculating, Difference equations, Solving Difference Equations with Linear Factors, Classification, Impact Response. • Introduction to Fourier Analysis, Discrete Time Fourier Transform, Discrete Time Fourier Transform Properties, Discrete Fourier Series, Discrete Fourier Transform, Discrete Fourier Transform Properties. • Fast Fourier Transform, The aim of Fast Fourier Transform, Butterfly network, Frequency Division and Time division multiplexing, Fast convolution – Overlap – Add and Overlap – Save Method, Discrete cosine transform. • Z – Transform, Z – Transform properties, Use Z – Transform to solve Difference Equations, The Z – Transform utility in the analysis of discrete Linear and Time invariant systems, Inverse Z – Transform, Calculate Inverse Z – Transform. • The concept of frequency response, Introduction to Transfer Function, Effect of poles on frequency response, Implementation Discrete Systems. • Introduction to Filters, Finite Impulse Response Filters (FIR), The concept of linear phase, Median Filtering, FIR Design, Infinite Impulse Response Filters (IIR), IIR Design, Lowpass Analog Filters, IIR Filter Design.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able: • to understand simple and complex concepts of digital signal processing. • to perform sampling, oversampling, under sampling. • to calculate convolution and correlation in signals. • to apply DFT and ZT to real or complex signals. • to design FIR and IR digital filters. • to design software for all of the above in MATLAB.
PREREQUISITES	-

TEACHING METHODS	Lectures, theoretical exercises, examples in MATLAB, exercises in MATLAB
ASSESSMENT METHODS	One optional exercise with oral examination (40%) Final written examination (60%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	*- Recommended Book Resources:* 1. *DIGITAL SIGNAL ANALYSIS, PROAKIS J., MANOLAKIS D., ION PUBLICATIONS, 2010.* 2. *BASIC TECHNIQUES OF DIGITAL SIGNAL PROCESSING, MOUSTAKIDIS GV, A. TZIOLA & SONS PUBLICATIONS SA, 2004.* 3. *DIGITAL SIGNAL PROCESSING, HAYES M.H., A. TZIOLA & SONS PUBLICATIONS SA, 2000.* 4. *DIGITAL SIGNAL PROCESSING, FOTOPOULOS SD, OLYMPIA PUBLICATIONS AN. PHOTOPOULOU, 2010.*

ELECTRONICS II

COURSE UNIT CODE	MK30
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	5th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE357/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Kollatou T.
COURSE CONTENTS	Field Effect Transistor (FET, MOSFET, CMOS), Fundamentals, Biasing, Basic Principles of MOSFET Amplifiers. Frequency Effects, Frequency Response of an Amplifier, Decibel Voltage Gain and Power Diagrams, Bode, Effect Miller. Differential Amplifiers, Analysis of DC and AC, Common-Mode Gain. Operational Amplifiers, Operational Amplifier 741. Negative Feedback, Topologies, Bandwidth. Linear Circuits Operational Amplifiers, Inverting and Noninverting Amplifiers, Differential Amplifiers, Instrumentation Amplifiers, Summing Amplifier Circuits, Power Amplifiers. Nonlinear Circuits Operational Amplifiers. Oscillators, The 555 Timer, Monostable and Astable Operation of the 555 Timer, The Phase Locked Loop Oscillator.
LEARNING OUTCOMES/ GENERAL COMPETENCES	This course is an introduction to electronic circuits with MOSFET transistors, Op-Amp circuits and filters. The student acquires knowledge of the scope of the above circuits and learns how to use these skills to solve and deal with related practical problems and issues. In addition, the students acquire the knowledge and practical skills to analyse and understand the above electronic circuits. With the appropriately designed laboratory exercises and circuits that the students are required to prepare, they acquire the experience to construct and characterise experimentally a series of practical circuit and at the same they learn how to use efficiently laboratory instrumentation.
PREREQUISITES	Electronics I
TEACHING METHODS	Lectures, Laboratory Practical Exercises and tutorials

ASSESSMENT METHODS	• Interim Progress Exam Test, Submission of weekly written lab exercises, Final Examination Laboratory (prerequisite base 5 in the final examination laboratory), Final Theory Examination (prerequisite base 5 in the final examination of the theory). • Final Course Grade (100%): Final written examination theory (added the bonus of the Interim Progress Exam Test) = 75% Final Written Examination and Laboratory = 25%.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Malvino A.P., Bates D.J., *Electronics Principles*, Εκδόσεις Επίκεντρο Α.Ε., 2007. 2. Jaeger Richard C., *Μικροηλεκτρονική*, τόμος Β΄, Εκδόσεις Α. Τζιόλα & Υιοί, 1999. 3. Millman Jacob, Grabel Arvin, *Μικροηλεκτρονική*, τόμος Β΄, Εκδόσεις Α. Τζιόλα & Υιοί, 2000. 4. Τόμπρας Σπ., *Εισαγωγή στην Ηλεκτρονική*, Εκδ. Δίαυλος, 2006.

Computer Architecture

COURSE UNIT CODE	K31
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	5th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE155/ https://arch.icte.uowm.gr/courses/arch/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Dasygenis M.
COURSE CONTENTS	Introduction to Computer Systems. Central Processing Unit organization and architecture (CISC/RISC). Organization of Memory types. Memory Hierarchy. Input-Output. Cache Memory. Datapath and CPU Control. Interrupts and CPU support. Storage Systems. Multicore architectures. Performance of Computer Systems. Microprogramming. Pipeline. Reliability Issues. Branch Prediction. Out of Order execution. Superscalar. VLIW Laboratory assignments of x86 assembly language programming.

LEARNING OUTCOMES/ GENERAL COMPETENCES	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the CPU types, • the architectural mechanisms for increasing CPU speed, • the CPU datapath, • the CPU pipeline, • the input/output mechanisms, • the peripheral interconnection to the CPU, • the data buses, • the cache memory operation, • the CPU control using assembly instructions From the laboratory assignments, students will gain the abilities to: • use the layer of assembly programming, • understand the benefits and drawbacks of using assembly language, • develop and debug assembly programs, • understand all x86 assembly constructs, • understand input/output techniques in the x86 world, • understand how to manipulate strings, • use the software and hardware interrupts, • create interrupt handlers, • to visualize graphic elements using assembly. The course attendance aims: • Individual/Independent work • Group/Team work • Project planning and management • Bibliography research • Critical thinking
PREREQUISITES	Digital Design
TEACHING METHODS	Lectures, PowerPoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, open courses video lectures, laboratory exercises, semester group project.

ASSESSMENT METHODS	The final grade is the sum of the laboratory grade and theory grade. The Maximum for these grades is 5, totaling both in 10. The students have to pass the Laboratory (at least 2.5/5) and Theory (at least 2.5/5), and also be present at the 85% of the laboratory sessions. Theory Examination (max 5 grades) • Multiple Choice Questions Examination – 3 • Theory Exercises – 2 Lab Examination (max 5 grades) • Labpoints (completing code challenges) - 2 • Semester Project - 2 • Lab Examination (code writing) - 1
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	Greek Books from Eudoxos 1. Βιβλίο [86055864]: ΨΗΦΙΑΚΗ ΣΧΕΔΙΑΣΗ ΚΑΙ ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΥΠΟΛΟΓΙΣΤΩΝ, ΕΚΔΟΣΗ ARM®, SARAH L. HARRIS, DAVID MONEY HARRIS 2. Βιβλίο [68370526]: Αρχιτεκτονική Υπολογιστών, Δημήτριος Β. Νικολός 3. Βιβλίο [15120]: Οργάνωση και αρχιτεκτονική ηλεκτρονικών υπολογιστών, Hammacher Carl,Vranesic Zvonko,Zaky Safwat 4. Βιβλίο [12561945]: ΟΡΓΑΝΩΣΗ ΚΑΙ ΣΧΕΔΙΑΣΗ ΥΠΟΛΟΓΙΣΤΩΝ: Η ΔΙΑΣΥΝΔΕΣΗ ΥΛΙΚΟΥ ΚΑΙ ΛΟΓΙΣΜΙΚΟΥ, DAVID A. PATTERSON, JOHN L. HENNESSY

TECHNO-ECONOMIC STUDY

COURSE UNIT CODE	MKH8
COURSE UNIT TYPE	General background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	5th
ECTS CREDITS	4
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE361/
TEACHING WEEKLY HOURS	3
INSTRUCTOR	P. Gaidatzis
COURSE CONTENTS	Businesses on a daily basis are faced with a wide range of issues that they need to manage and resolve by making decisions that shape their financial future. In the lesson themes are developed referring to the following areas: 1. business concept, 2. time value of money, 3. uniform series of payments (rants), 4. calculation of loan details, 5. methods used to assess the feasibility or otherwise of an investment, 6. break-even point calculation of the turnover, 7. risk management and calculation methods. Particular emphasis is given to the part of tutorial exercises in repetitive combinatorial exercises that integrate into practical applications and problems all the theoretical and practical methods that have been analyzed in previous lessons.

LEARNING OUTCOMES / GENERAL COMPETENCES	The purpose of the Techno-economic Analysis course is to understand the basic concepts of the purpose of financial management in a business, to analyze the financial environment in which it operates, as well as to acquire theoretical and practical knowledge on the proper methodology to be followed for the evaluation of investments in fixed assets in conditions of certainty, valuation of inventories and value of enterprises, as well as risk management in conditions of uncertainty. Upon successful completion of the course the student will be able to: • Know the objective of the business from a financial management point of view. • Understand the time value of money. • Have knowledge of the various methods of valuation of fixed assets investments under certain conditions. • Analyze risk management in conditions of uncertainty. • Calculate the break-even point of a business's turnover. • Combine all the previous tools for solving complex problems. • Use computing tools (e.g., Microsoft Excel) to evaluate investment programs. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Adapting to new situations • Decision-making • Group/Team work • Project planning and management

PREREQUISITES	-

TEACHING METHODS	• Onsite learning • Option of Modern distance learning courses
ASSESSMENT METHODS	• Interim evaluation progress (30%) • Teamwork of econometric analysis in an energy investment case study (30%) • Final Written Examination (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Michael Nikolaidis, Techno-economic Analysis Guide, Code Edoxos:77111926. 2. T. Anastasiou, Techno-economic studies, Code Eudoxos: 16520. 3. C. Kyriazis, Techno-economic studies, Code Eudoxos: 18548963. 4. Th. Lazaridis, G. Conteos, N. Sariannidis, Contemporary Financial Analysis, Code Eudoxos: 59381279.

6TH SEMESTER

MICROPROCESSORS

COURSE UNIT CODE	E22
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	6th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE358
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Asimopoulos N.
COURSE CONTENTS	The course is about understanding how to operate and program microprocessors (and generally large-scale digital circuits). It includes extensive reference to the architecture and programming of the AVR microcontrollers, in particular the ATmega328, various sensors and actuators, as well as the electronics needed to integrate them all into a single integrated system. In addition, issues of architecture and programming of Broadcom BCM2835 microprocessors will be discussed.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, students gain knowledge and understanding of the following topics: Understanding the architecture of microprocessors. Understand how to program microcontrollers and microprocessors in machine language, the data path to the processors, the connection of peripherals and sensors to the central processing unit, of channels memory function, of controlling the processor via assembly commands. Upon successful completion of the laboratory part of the course, students gain knowledge and understanding of the following topics: Programming in assembly language, programming and debugging in assembly language for ARM processors and AVR microcontrollers, input / output in assembly language on AVR and ARM microprocessors,
PREREQUISITES	Digital Design

TEACHING	-
ASSESSMENT METHODS	Final exams theory 50%, Final exams lab 50%
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Πογαριδης Δημητριος, Σχεδιαση Συστηματων Μικροεπεξεργαστων, Μούργκος Ιωάννης, Έκδοση: 2/2010. 2. Ν. Πετρελλης, Γ. Αλεξιου, Μικροεπεξεργαστες Και Σχεδιασμος Μικροϋπολογιστικων Συστηματων, Κλειδαριθμος, Έκδοση: 2η/ 2012. 3. Πογαρίδης Δ., *Σχεδίαση Συστημάτων Μικρουπολογιστών*, Μαρια Παρικου, Έκδοση: 1η/2013. 4. Παπάζογλου Παναγιώτης, *Μικροεπεξεργαστές*, Εκδοσεις Α. Τζιολα, Έκδοση: 1η/2015. 5. Καλοφωλιάς Δημήτριος, *Προγραμματισμός Του Μικροελεγκτή*

COMMUNICATION SYSTEMS

COURSE UNIT CODE	MK29-H
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	6th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE330/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	
COURSE CONTENTS	The aim of the course is to provide students with knowledge about basic concepts of telecommunication systems. Specifically, the course focuses on the principles of signal theory, studying the properties of telecommunication signals and mathematical transformations (Fourier, Hilbert) as essential tools for communication signal analysis. The main objective of the course is to learn the process of modulation of signals of analog systems, through the study of Amplitude Modulation (AM), AM systems, the process of decoding amplitude, systems of Angle Modulation (Frequency Modulation - Frequency Modulation - Frequency Modulation). Phase Modulation (PM)), and angle demodulation procedures. The effect of noise on both amplitude and angle modulation systems is also studied.

LEARNING OUTCOMES/ GENERAL COMPETENCES	Learning the following basic concepts: Telecommunication System (Analog and Digital Communications) Representation of Signals and Systems with emphasis on the Frequency field Fourier transforms and their applications in Telecommunications Filters and Signal Transmission through them Width Modulation and Demodulation Rectangular Amplitude Configuration - Frequency Division Multiplexing Angle Configuration and Demodulation Familiarity with the environment of telecommunication systems laboratories Use of Laboratory Equipment Conducting laboratory exercises: Laboratory Exercise in AM. Laboratory Exercise in FM. Laboratory Exercise in PM.
PREREQUISITES	-
TEACHING METHODS	Lectures Exercises Laboratory Exercises
ASSESSMENT METHODS	Final written exam (70%), Laboratory exercises (30%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Γεώργιος Καραγιαννίδης, Κοραλία Παππή, Τηλεπικοινωνιακά Συστήματα, 3η εκδοση, 2016. 2. Αθανάσιος Κανάτας, Εισαγωγή στις Τηλεπικοινωνίες, 2η έκδοση, 2017. 3. Παναγιώτης Κωττής, Εισαγωγή στις Τηλεπικοινωνίες: Διαμόρφωση και Μετάδοση Σημάτων, 2012.

DATABASES

COURSE UNIT CODE	MK38
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	3rd
SEMESTER	6th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE215/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Stergiou K.
COURSE CONTENTS	1. Introduction to databases (DBs) and DB Management Systems. 2. Architecture of DB Systems. 3. Entity-Relationship model. 4. Relational Model. 5. Relational Algebra. 6. Structured Query Language (SQL). 7. Functional Dependencies and Normalization. 8. Physical organization of DBs and means of storage. 9. Indexes.
LEARNING OUTCOMES/ GENERAL COMPETENCES	The expected learning outcomes are the following: 1. Understanding the basic principles of design and implementation of Database Systems 2. Familiarity with using Entity Relationship Diagrams 3. Understanding the Relational Model 4. Acquisition of basic knowledge of Relational Algebra and SQL 5. Acquisition of advanced SQL capabilities knowledge 6. Experience with MySQL 7. Understanding the basic principles of normalization 8. Acquisition of knowledge about the storage of Databases and basic indexing structures 9. Experience in collaborative database implementation
PREREQUISITES	-
TEACHING METHODS	Lectures, exercises, lab exercises

ASSESSMENT METHODS	The evaluation is done through: 1. written examination at the end of the semester that includes short answer questions and resolution of exercises 1. scoring the report and the code of the project carried out during the semester. The scoring is done separately for each of the four phases of the project and in total at the end 2. oral presentation of the various phases of the project carried out during the semester The evaluation criteria are as follows: • correctness • clarity • accuracy • efficiency
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Elmasri Ramez, Navathe Shamkant B., Fundamentals of Database Systems, 2007. 2. Ramakrishnan Raghu, Gehrke Joahannes, Database Management Systems, 2012. 3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database Systems, 2011. - Recommended Article/Paper Resources: ACM Transactions on Database Systems, VLDB Journal, IEEE Transactions on Knowledge and Data Engineering, Information Systems

CONTROL SYSTEMS I

COURSE UNIT CODE	Y4-H
COURSE UNIT TYPE	General background
YEAR OF STUDIES	3rd
LEVEL OF STUDY	Undergraduate
SEMESTER	6th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE369/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Parisis K.
COURSE CONTENTS	The weekly sections include the introduction to control systems with presentation of applied control examples from various technical fields. The mathematical model of the physical systems and the ordinary differential equation that governs them are described. Open-closed loop systems. Laplace transform, partial fraction expansion. Zero initial value-zero input response, system transfer function. System transfer matrix. Block diagrams and their transformations, signal-flow graphs. State variables and state differential equations of dynamic systems. Time response of 1st and 2nd order systems, performance indices. Steady-State errors. Simulation of systems with Simulink. Control systems stability, Routh-Hurwitz stability criterion. Root Locus Method.

LEARNING OUTCOMES / GENERAL COMPETENCES	The purpose of this course is to provide the student with a comprehensive introduction to the theory and applications of Control Systems with emphasis in the analysis. The student will deal with the simulation of physical systems on a computer and finding design criteria performance through assignments and solving selected exercises. In addition, the student will complete a series of selected laboratory exercises that implement experimental devices and use Operational Amplifiers (OPAMPs) in the simulation of systems. Upon successful completion of this course the student will be able to: 1. Distinguish the meaning of open and closed loop and to understand the process of feedback and comparison. 2. Develop the mathematical model that describes the physical system to be examined and derive the differential equation that characterizes it. 3. Familiarize himself with the use of the Laplace transform to be able to calculate systems response. 4. Be able to describe a system with the help of the transfer function and state equations. 5. Learn the use of operating diagrams and flowcharts for system representation. 6. Design Root Locus plots. 7. Implement experimental devices and to use operational amplifier circuits (OPAMPs) in systems simulation. General Competences: • Search, analyze and synthesize data and information with the use of the necessary technologies • Individual Work • Teamwork • Design and Project Management
PREREQUISITES	Knowledge of the course is required: Applied Mathematics I
TEACHING METHODS	• Face to Face

ASSESSMENT METHODS	I. Written final examination (70%) comprising: - Solving problems related to quantitative data II. Final laboratory test (30%), which includes mandatory individual assignments (30% of the laboratory examination)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Σύγχρονα Συστήματα Αυτομάτου Ελέγχου, 13η Έκδοση, Dorf Richard C., Bishop Robert H., ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2017. 2. Συστήματα Αυτομάτου Ελέγχου, Ogata K., ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, 2011. 3. Συστήματα Αυτομάτου Ελέγχου, 2η Έκδοση, Μαλατέστας Παντελής, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2017. 4. G. F. Franklin and al, Feedback control of Dynamic Systems, 5th ed., Pearson Prentice Hall, 2006. 5. Π. Ν. Παρασκευόπουλος, Εισαγωγή στον Αυτόματο Έλεγχο. Τόμος Α Θεωρία, Αθήνα 2001.

COMPUTER NETWORKS

COURSE UNIT CODE	MK19-H
COURSE UNIT TYPE	General background
YEAR OF STUDIES	3rd
LEVEL OF STUDY	Undergraduate
SEMESTER	6th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE370/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Fragkoulis G.
COURSE CONTENTS	Network design principles. The Medium Access Control (MAC) sublayer. The channel allocation problem. Multiple access protocols (ALOHA, CSMA). Ethernet (IEEE 802.3 standard). Wireless LANs (IEEE 802.11 Standard). Internetworking. TCP/IP protocol stack. The Internet Protocol (IP). Addressing and Subnetting. NAT - Network Address Translation. Internet Control Protocols (ICMP, ARP). Interdomain Routing (BGP, RIP, OSPF). IPv4, IPv6, mobile IP. TCP protocol. UDP protocol. Usage of simulation packages.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to: • understand the central theories, and protocols in the fields of computer networks • describe and analyze the hardware, software, components of a network and the interrelations. • explain networking protocols and their hierarchical relationship hardware and software. • compare protocol models and select appropriate protocols for a particular design. • explain concepts and theories of networking and apply them to various situations, classifying networks, analyzing performance, and implementing new technologies.
PREREQUISITES	-
TEACHING METHODS	Lectures, laboratory sessions

ASSESSMENT METHODS	Final exam (30%), Presentation (exercise) (20%), Lab exam (50%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Δικτύωση Υπολογιστών, 7η Έκδοση, J. F. Kurose, Keith W. Ross 2. Δικτυα Υπολογιστων, A. S. Tanenbaum, David J. Wetherall 3. Οργάνωση και Αρχιτεκτονική Υπολογιστών, 11η Έκδοση, Stallings William

ELECTRICAL MACHINES I

COURSE UNIT CODE	MKH9
COURSE UNIT TYPE	Specialization
YEAR OF STUDIES	3rd
LEVEL OF STUDY	Undergraduate
SEMESTER	6th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE365/
TEACHING WEEKLY HOURS	5
INSTRUCTOR	Tsiamitros D.

COURSE CONTENTS	Dc machines II - Generator operation –series excitation, compound excitation. – motor operation – series excitation, compound excitation - motor start. - speed control. - motor brake. Three-phase transformers - Construction characteristics, equivalent circuit. - 3-phase connection types - open and short circuit tests. - 3-phase transformers loading. - Parallel transformers Synchronous generators - Structure. Operation principle and types. Turbo-generators: - Speed control, - voltage control, - Equivalent circuit, -Power control, - Operation limits - parallel generators, Salient pole generators - Structure - Equivalent circuit Transients Asynchronous motors - Torque-speed characteristics, - Start, - Special applications motors (one-phase, universal, others)
LEARNING OUTCOMES / GENERAL COMPETENCES	On successful completion of this module the learner will be able to: 1. Understand adequately the ac motors and generators, DC-Machines and Transformers operational principles. 2. Predict the machine operation under different conditions 3. Solve electric machines problems using the applicable equivalent circuit
PREREQUISITES	Electric Circuits I and II, Mathematical Analysis I and II, Electromagnetics
TEACHING METHODS	Lectures, Problems solving in class, Laboratory exercises, Homework-study

ASSESSMENT METHODS	Evaluation of laboratory exercises (20%) - Two unannounced tests and one progress test (30%) - Final exams (50%)
LANGUAGE OF INSTRUCTION/	Greek
RECOMMENDED BIBLIOGRAPHY	1. Ν. Σκραπαρλής, Β. Μολασιώτης, Δ. Τσιαμήτρος, «Εργαστηριακές Ασκήσεις Ηλεκτρικών Μηχανών Συνεχούς και Εναλλασσομένου Ρεύματος», Εκδ. Σύγχρονη Παιδεία, ISBN: 978-960-357-114-8. 2. Chapman S., Electrical Machinery Fundamentals, Fourth

7TH SEMESTER - DIVISION OF ENERGY

Electric Power Transmission and Distribution

COURSE UNIT CODE	YEH1
COURSE UNIT TYPE	General background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=134
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bouhouras A.
COURSE CONTENTS	The course consists of the following subjects/entities: 1. Power lines electrical characteristics • overhead power lines and underground cables, calculation of suspension arrow and forces in over-head power lines 2. Electrical models of power lines • short line model, medium and long line models, two-terminal models, power transfer and lines' operational limits 3. Voltage regulation • reactive power compensation, special types of transformers and synchronous compensators, trans-former tap-changer 4. AC power flow analysis • basic concepts, power flow in radial networks, simplified power flow methods, Gauss-Seidel method, complex power flow in large systems Newton-Raphson method, decoupled power flow 5. Distribution network topologies in Low and Medium Voltage • distribution network types, distribution network operation, medium voltage substations 6. Distribution network analysis • voltage drop computation in distribution network with distributed loads, distribution network power loss computation, distribution network node voltage regulation 7. Distribution network load • load curve, peak load, energy demand, mean load, demand factor, usage factor, synchronization coefficient, load demand patterns.

LEARNING OUTCOMES / GENERAL COMPETENCES	After successful completion of the course, students will be to: • Understand and recognize the structural and operations differences between transmission and distribution power systems. • Compute the electrical characteristics of different power line models and understand their single-phase circuits • Apply the suitable reactive power compensation type and voltage regulation method in power lines • Understand power flow in power lines and its mathematical modelling • Compute AC power flow in a power circuit and compute voltage drop • Compute power loss in a power line • Know the distribution network topologies and their structural characteristics • Understand different load demand patterns kai compute the demand characteristics • Analyze and simulate power systems via software packages (e.g., DigSILENT) General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Decision-making • Group/Team work • Project planning and management • Development of free, creative and inductive thinking • Development of new research ideas

PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance learning availability

ASSESSMENT METHODS	The language of evaluation is Greek. The overall rating is divided as follows: - Laboratory exercises (30%) - Written work (30%) - Final exams (40%) consisting of: 1) problem solving 2) short-answer questions 3) multiple choice tests The laboratory exercises are based on the analysis of a circuit-case study through a software tool. The essay writing is based either on the literature review for the development of a topic description work based on scientific publications, or on the development of algorithms and methodologies for solving research problems for innovative research actions on Power Systems. The course examination process includes short answer questions and solving tutorial exercises. The answers of the exam questions are posted in eclass, and the grade of each subject in which they are evaluated is known in advance to the students. Each student can request a demonstration of the writing and his / her grade will be analyzed.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	[1] Transmission and Distribution of electric energy, Weedy B. M., Cory B. J. ION publication, Code Eudoxus: 14651 [2] Power System Analysis, John Grainger, William Stevenson, Jr. Code Eudoxus:59369529 [3] Power Systems, 2nd edition, P. Malatestas, Code Eudoxus: 59388044 [4] Power Systems, Nasar Syed A., Code Eudoxus: 18548740 Relevant scientific journals: • IEEE Transactions on Power Systems • IEEE Transactions on Smart Grid • Electric Power System Research (Elsevier)

ELECTRICAL MACHINES II

COURSE UNIT CODE	YEH2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE386/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Tsiamitros D.

COURSE CONTENTS	• Dc machines II -Generator operation –series excitation, compound excitation. – motor operation – series excitation, compound excitation - motor start. - speed control. - motor brake. • Three-phase transformers - Construction characteristics, equivalent circuit. - 3-phase connection types - open and short circuit tests. - 3-phase transformers loading. - Parallel transformers • Synchronous generators - Structure. Operation principle and types. • Turbo-generators: - Speed control, - voltage control, - Equivalent circuit, -Power control, - Operation limits - parallel generators, • Salient pole generators - Structure - Equivalent circuit Transients • Asynchronous motors - Torque-speed characteristics, - Start, • Special applications motors (one-phase, universal, others)
LEARNING OUTCOMES / GENERAL COMPETENCES	On successful completion of this module the learner will be able to: 1. Understand adequately the ac motors and generators, DC-Machines and Transformers operational principles. 2. Predict the machine operation under different conditions 3. Solve electric machines problems using the applicable equivalent circuit 4. Adequately install and operate electric machines
PREREQUISITES	Electric Circuits I and II, Electromagnetics, Electric machines I
TEACHING METHODS	Lectures, Problems solving in class, Laboratory exercises, Homework-study

ASSESSMENT METHODS	- Evaluation of laboratory exercises (20%) - Two unannounced tests and one progress test (30%) - Final exams (50%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Ν. Σκραπαρλής, Β. Μολασιώτης, Δ. Τσιαμήτρος, «Εργαστηριακές Ασκήσεις Ηλεκτρικών Μηχανών Συνεχούς και Εναλλασσομένου Ρεύματος», Εκδόσεις Σύγχρονη Παιδεία. 2. Chapman S., Electrical Machinery Fundamentals, Fourth Edition, McGraw-Hill Inc.

POWER ELECTRONICS I

COURSE UNIT CODE	YE3
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY108/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Oureilidis K.
COURSE CONTENTS	The course of Power Electronics I consists of the following sections: 1. Power Semiconductors: Types of power semiconductors used as switches in Power Electronics systems (e.g., diodes, thyristors, MOSFET, IGBT, etc.). Operating characteristics, uses, loss calculation, benchmarking. 2. Uncontrollable Rectifiers: Single-phase, three-phase, output voltage smoothing, harmonic analysis, transition effect. 3. Controllable Rectifiers: Single-phase, three-phase, DC / DC, harmonic resolution, transition effect, power reversing function 4. AC-AC Converters: a) AC regulators: Single-phase-three-phase, analysis, applications, b) Circuit converters

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of the course is to introduce the student to the theory and applications of power electronics systems. In the first part of the course, 2 categories of electronic power converters are studied: rectifiers (AC-DC) and AC-AC converters. Upon successful completion of the course the student will be able to: • Identify, compare and describe the main power semiconductor devices, while the student should also calculate their losses; • Understand and explain the principles of power electronics; • Explain in detail the basic functions of the different types of power converters examined in the 1st part of the course; • Compare and evaluate the individual circuits of each type of power converters; • Implement experimental devices in the laboratory and analyze their operation; • Simulate and explain the operation of basic power converters; • Design power converter circuits belonging to the categories of AC-DC and AC-AC converter; • Use the knowledge acquired to understand converter topologies in practical applications; • Collaborate with his fellow students to prepare teamwork essays. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Adapting to new situations • Decision-making • Autonomous work • Teamwork • Project planning and management • Critical thinking of complex concepts

PREREQUISITES	Electrical Circuits I and II
TEACHING METHODS	• Teaching in the classroom with a video projector and tutorial exercises • Laboratory exercises on AC-DC and AC-AC converters • Possibility of modern distance education

ASSESSMENT METHODS	- Laboratory exercises with group work (30%) - Individual work in the design / analysis of inverters using and simulations (30%) - Final exams (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. Mohan Ned, Undeland Tore A., Robbins William P. 2010, Introduction to Power Electronics, A. Tziola & Sons O.E. Publications 2. M. Rashid, 2010, Power Electronics, ION Publications. 3. Mania St., 2017, Power Electronics, Kalamara Elli Publications 4. D. Hart, 2011, Introduction to Power Electronics, Prentice Hall Publications - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: • IEEE Transactions on Power Electronics • IET Power Electronics

MODERN ELECTRICAL INSTALLATIONS

COURSE UNIT CODE	YEH4
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY106/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Stimoniaris D.
COURSE CONTENTS	Dangers from electricity, protection devices. Types of low voltage conductors and cables. -Installation of cables-connection and fittings. Pipes and fittings for electrical installations. Ducts. -Cable charging capacity according to the standards of ELOT HD384, VDE, IEC, DIN. -Overvoltage and short circuit protection devices, load switches, power relays (relays), thermal protection relays for asynchronous three-phase motors. -Calculation of power supply lines. Calculation of the voltage drop in Low Voltage networks. -Electrical Panels. Voltage sinking. -Complete electrical study of a house, shop, boiler room, electric elevator engine room. -Special Electrical Installations. -Introduction to building energy management automation in smart buildings (KNX)

LEARNING OUTCOMES / GENERAL COMPETENCES

This course provides the basic knowledge and techniques for the preparation of design and
construction of internal electrical installations of buildings in accordance with applicable
standards and national regulations, with the development of the following topics:

• Basic concepts in electricity distribution systems. Electrification process of low voltage
internal electrical installations, ways of connection to the PPC network. Low voltage
overhead power line.
• Classification of indoor electrical installations. Calculation of installed power. Categories of
pipes for indoor electrical installations, materials, components and means of protection of
indoor electrical installations. Grounding systems and protection against electric shock.
• Typical connections of luminaires, sockets and household appliances. Complete calculation
of household electrical installation. Calculation of voltage drop across conductors. Panels of
indoor household electrical installations.
• Low current installations.
• Outdoor installations. Installations of special buildings.
• Standards and Regulations of electrical installations. (HD384). Control of an internal
electrical installations.
• Modern household electrical installations (EIB / KNX).
Study and design of electrical installations with a computer. The student is required to
complete a series of selected laboratory exercises in the above material. In addition, the
student is required to prepare and submit at the end of the semester a written assignment
on the subject of electrical design of a building.

Upon successful completion of the course the student will be able to:
1. Have the theoretical background to prepare and compile Electrical Studies of buildings.
2. Effectively implement regulations and standards regarding the requirements for electrical

PREREQUISITES	Introduction to RES, Electrical Circuits I and II
TEACHING METHODS	-Teaching in the classroom using a video projector. - Laboratory exercises. - Learning process support through the electronic platform e-class. - Use of specialized software.
ASSESSMENT METHODS	I) - Type: Deliveries (50% of the total) - Description: Theoretical Background - Exam Date: End of Semester II) - Type: Laboratory (30% of the total) - Description: Laboratory Exercises - Exam Date: End of Semester III) - Type: Presentation (Work / Technical Study) (20% of the total) - Description: Complete Design of Internal Electrical Installation - Exam Date: End of Semester
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Βασιλης Δ. Μπιτζιωνης Βιομηχανικες Ηλεκτρικες Εγκαταστασεις 2010 Εκδοσεις Τζιωλα 2. Τουλόγλου Στέφανος Ηλεκτρικες Εγκαταστασεις Κτιριων 2004 Εκδοσεις Ιων 3. IEC 60364: Low-voltage electrical installations 4. ΕΛΟΤ HD384, «Απαιτήσεις για ηλεκτρικές εγκαταστάσεις» 5. Schneider-Electric, Electrical Installation Guide.

INTRODUCTION TO NUCLEAR TECHNOLOGY

COURSE UNIT CODE	EEH17
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	Nuclear technology and energy, atomic and nuclear physics, interactions of radiation and matter. Radiation sources in the natural environment. Fission and fusion. Technology and operation of nuclear reactors, diffusion, heating and deceleration of neutrons, time-varying reactor, reactor safety and environmental protection. Power stations with new generation reactors. Radioactivity measurement and shielding, units and conversion factors, fundamental constants and data. Industrial applications of nuclear radiation. Biological effects and protection.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course the student will be able to: Understand the concepts of radioactive decay and the interaction of radiation with matter Know the industrial applications of radiation Describe and know the safety measures for the operation of nuclear power plants and radiation protection. Make radiation measurements using the appropriate instruments Know the structure and operation of power plants with nuclear reactors. Understand the biological effects of radiation
PREREQUISITES	-
TEACHING METHODS	- Classroom teaching and tutoring exercises - Learning process support through e-class
ASSESSMENT METHODS	Individual assignment (50%) - Final exams (50%)

LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. ΕΙΣΑΓΩΓΗ ΣΤΗΝ ΠΥΡΗΝΙΚΗ ΤΕΧΝΟΛΟΓΙΑ, Αντωνόπουλος -Ντόμης Μιχάλης, Εκδόσεις Ζήτη, Κωδ. Εύδοξος: 11266 2. Εισαγωγή στην Πυρηνική Τεχνολογία, J. Lamarsh, A. Baratta, 4η έκδοση, επιμέλεια Ν. Πετρόπουλος , Εκδόσεις Τζιόλα.

LIGHTING

COURSE UNIT CODE	EEH2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=138&lan=en
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Z. Datsios
COURSE CONTENTS	The contents of the “Lighting” course are: • Electromagnetic radiation and light • Human vision • Color temperature, colorimetry • Fundamental laws, photometric quantities and units • Light sources: modern lamps, properties and comparison • Interior lighting • Exterior lighting • Daylighting • Energy management and lighting economics • Photometric measurements • Software for interior and exterior lighting

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of this course is to introduce undergraduate students to lighting and photometry, including both theory and applications. Undergraduate students attending and completing successfully the "Lighting" course will be able to: • Comprehend the fundamental laws and basic principles of lighting, as well as the photometric quantities. • Identify, compare and describe light sources and fixtures. • Comprehend the basic principles and techniques for interior and exterior lighting. • Conduct studies for interior and exterior lighting. • Use up-to-date software tools. • Cooperate with other students in the context of projects. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies. • Individual/Independent work • Group/Team work • Development of free, creative and inductive thinking

PREREQUISITES	-
TEACHING METHODS	- Lecturing (theory and exercises) in the classroom using projector - The course is supported by the UOWM Open eClass platform - Laboratory exercises using specialized software - Semester project for interior and exterior lighting
ASSESSMENT METHODS	Language of evaluation: Greek - Semester project for interior and exterior lighting (50%) - Final examination (50%) Final examination: Presentation, oral exam The evaluation process is: • announced to the undergraduate students during the first lecture and the first laboratory exercise • uploaded to the OWM Open eClass platform
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. F. V. Topalis, L. Ekonomou, S. Kourtesi, Lighting, Tziola Scientific Publications, 2nd Edition, ISBN: 978-960-418-422-4, 2014 (in Greek) - Additional educational material: 2. W. van Bommel, Interior Lighting, Springer Nature Switzerland, ISBN: 978-3-030-17195-7, 2019 - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: • Energy and Buildings • Lighting Research & Technology

AUTOMATION OF ENERGY SYSTEMS

COURSE UNIT CODE	EEH3
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE387
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Christoforidis G.
COURSE CONTENTS	• Introduction to programmable controllers. • Components and systems: processors, memory systems, discrete I / O systems, analog I / O systems, dedicated I / O function and serial communication interface. • Basic PLC Programming: PLC language types, Structure List (STL), Ladder, SFC and Functional Block Diagram (FBD). • Solve automations with KARNAUGH arrays and BOOLE algebra. • Advanced PLC Programming • Operation and cooperation of AC Drive and PLC. • Input-output devices: control transformers, fuses, switches, switches, relays, analog signal (voltage, current, power, temperature, pressure, liquid level, flow, etc.) transducers / transmitters. • Conversion and processing of analog signals. • Design programs with emphasis on power supply and management applications

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course the student will be able to: • identify and explain the main features of the design, the internal architecture, and the operating principles of the programmable logic controllers (PLC), • use input and output devices used in PLC systems, • use the basic communication links involved in PLC systems, • implement advanced automation in all PLC programming languages. • use LADDER, FBD programs that include internal relays (memories or flag), timers, counters, shift registers, clocks and handle application data, PI and PID controllers. • configure AC DRIVES and implement PLC and AC DRIVES collaboration programs to drive propulsion systems and reduce energy consumption. • Study and implement industrial production processes • to detect security issues with PLC systems, • use methods to save energy through automation. use methods for fault diagnosis and tests. General Competences: • Search for, analysis and synthesis of data and information using appropriate technologies, • Adapting to new situations • Decision-making • Individual/Independent work • Group/Teamwork • Introduction of innovative research • Project planning and management • Critical thinking • Development of free, creative, and inductive thinking

PREREQUISITES	-
TEACHING METHODS	• Teaching in the classroom using a video projector and tutorial exercises • Laboratory exercises with assignments, • Learning process support through the electronic platform e-class.

ASSESSMENT METHODS	The evaluation is performed in Greek language. It consists of 30% of the laboratory exercises (Problem Solving), 20% of the written work and its public presentation and 50% of the final exam. For the successful completion of the course, the average of the above criteria must be equal to or greater than 5. The criteria are accessible by everyone on the course website.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Hanssen "Programmable Logic Controllers - A Practical Approach Using CoDeSys Codes [Electronic Version]", 2015, HEAL-Link Wiley. 2. E.A. Parr, "Programmable Engineers Guide [Electronic Version]", 2003, HEAL-Link Elsevier Referex. 3. Petruzella F. "Programmable logic controllers" 5th edition, publisher: TZIOLAS, book code in Eudoxus: 59421534. 4. Collins D., Lein E. "Programmable Auditors - Practical Guide", 2nd edition, publisher: Tsotras Athanasios. 5. GOURGOULIS D. - PAPASTAMOULIS A. - PRASSAS CH. "Digital systems - Computer networks", Chapter 3 - Programmable logic controllers, EVGENIDOU FOUNDATION. 6. L.A. Bryan - E.A. Bryan, “Programmable Controllers - Theory and Application” 2nd Edition

Heat Transfer

COURSE UNIT CODE	EEH4
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY122/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Florini
COURSE CONTENTS	The Heat Transfer course consists of the following sections: • Introduction to heat transfer mechanisms • Heat transfer with conduction, conduction equation, thermal resistance • Heat transfer with convection, boundary layers, flow types • Extending surfaces / fins, performance, optimization • Heat exchangers, heat permeability, energy balance, temperature difference • Transient phenomena – concentrated capacity, temperature / space ratio, Heisler chart • Heat transfer via radiation – black body, zone and surface emission, Kirchoff’s law, thermal radiation transaction

LEARNING OUTCOMES / GENERAL COMPETENCES	After the successful completion of the Heat Transfer course the student would be able to: • Comprehend and explain the basic heat transfer mechanism • Develop the specific characteristics of the heat transfer mechanisms as well as compare the heat transfer mechanisms • Comprehend and analyze the operation and the specific characteristics of heat exchangers • Calculate heat transfer parameters in typical problems with heat transfer phenomena • Comprehend and describe transient conduction phenomena After the successful completion of the Heat Transfer course the student would develop: • Ability of searching, analyzing and synthesizing raw data and processing information applying appropriate technology tools • Ability to adapt in new situations

PREREQUISITES	Thermodynamics
TEACHING METHODS	• Face – to – face education • Simultaneous distance education
ASSESSMENT METHODS	• Students' assessment will be performed via written examination process at the end of the Semester (80 %) as well as via individual projects (20 %) which will be assigned to the students during the Semester. • Both exams and projects consist of questions examining various heat transfer topics.
LANGUAGE OF INSTRUCTION/EXAMS	Greek, English

RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. Bergman T. L., and Lavine A. S., Fundamentals of Heat and Mass Transfer, 8th ed. John Wiley & Sons., 2017. 2. Çengel Y. A. and Ghajar A. J., Heat and Mass Transfer: Fundamentals and Applications, Mc Graw - Hill Education, 2015. 3. Lienhard IV J., H. and Lienhard V J., H., A Heat Transfer Textbook, Phlogiston Press Cambridge - Massachusetts, 2003. 4. Pitts D. R. and Sissom L. E., Theory and Problems of Heat Transfer, Schaum' s Outline Series, McGraw-Hill, 1998. 5. Çengel Y. A. and Boles M. A., Thermodynamics—An Engineering Approach, 8th ed. New York: McGraw-Hill, 2015. - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: • Applied thermal Engineering, Elsevier • Journal of Thermal Engineering, Springer • International Journal of Refrigeration, Elsevier

8TH SEMESTER – DIVISION OF ENERGY

RENEWABLE ENERGY SOURCES

COURSE UNIT CODE	EEH1
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY107/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Stimoniaris D.

COURSE CONTENTS	Outline of Theory: • Methods of analysis of solar radiation. Solar panels, types, efficiency, calculations. • Active and passive solar systems for heating and cooling. Heat storage methods. • Photovoltaic method of electricity production. Agricultural and industrial applications of solar energy. • Wind and mechanical power generation systems. Wind generators. Methods for estimating wind potential, selection of wind turbine location. • Production, storage and utilization systems of biomass products. • Energy from the sea (waves, tide, temperature difference). Geothermal. Small hydroelectric projects. • Parameter optimization when exploiting mild forms of energy. Lab Outline: • Familiarity with the real hybrid network of electricity generation from renewable sources, with an installed capacity of 3 kW of the laboratory. Demonstration, familiarization and measurements of photovoltaic panels with their inverters, small wind turbine and battery packs. • Introduction to the concept of smart microgrid, description of its architecture taking and processing of measurements in real time with the measurement collection system from the PC and from the screen of the autonomous inverter (island inverter). • Autonomous operation of the network with energy sources, photovoltaic panels, wind turbine, batteries and as an auxiliary source, the strong network of PPC and vice versa. Taking measurements and receiving meteorological data. • Introduction to the technology of electricity production from ethanol solution, beer, wine. Introduction to the technology of production and storage of hydrogen using electricity from a wind turbine. Real-time measurements on PC. • Performance comparison for different fuel type (ethanol solution, beer wine). Effect of temperature on the process. Comparison of water electrolysis process with the use of wind turbine and batteries. Measurement of output quantities of the hydrogen fuel cell for various electrical charges.

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of the course is to introduce students to the production and management of energy from renewable sources. Almost all methods of energy production, management and storage are analyzed, emphasizing the most dynamic and applied in our country. The students' approach to the above methods is strengthened during the laboratory teaching during which they manage the actually installed systems of renewable sources. Students are required to participate in a sufficient number of laboratory exercises that include all the basic renewable sources and are required to submit weekly assignments. They are also familiar with the simulation of facilities with renewable sources and the use of specialized software that supports the operation of such facilities. Upon successful completion of course the student will be able to: 1. Understand the operation of the various systems for the utilization of solar, wind energy, biomass and geothermal energy. 2. To know the measurement and calculation of their performance. 3. To evaluate a system of renewable energy sources in relation to its energy, environmental and social dimension. 4. Understand the concept and operation of hybrid systems and smart grids. 5. To dimension and monitor the operation of real energy production facilities from renewable sources.
PREREQUISITES	Introduction to RES
TEACHING METHODS	-Teaching in the classroom using a video projector. - Laboratory exercises. - Learning process support through the electronic platform e-class.
ASSESSMENT METHODS	I) - Type: Deliveries (50% of the total) - Description: Theoretical Background - Exam Date: End of Semester II) - Type: Laboratory Exercises (50% of the total) - Description: Combination of understanding and application - Exam Date: End of Semester
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY

1. Solar engineering of thermal processes / John A. Duffie, William A. Beckman, Wiley, 1991.
2. Advances in Solar Energy by Karl Boer (Editor), American Solar Energy Society, American Solar Energy Society, 1998.
3. Photovoltaic Systems Engineering by Jerry Ventre, Roger A. Messenger, CRC Press, 1999.
4. Photovoltaics by Randall Thomas, E & F N Spon, 2001.
5. Solar Electricity, 2nd Edition by T. Markvart (Editor), K. Bogus, John Wiley & Sons, 2000.

HIGH VOLTAGE ENGINEERING I

COURSE UNIT CODE	EEH5
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=142&lan=en
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	The contents of the “High Voltage Engineering I” course are: • Introduction to high voltage engineering • Introduction to high voltage engineering general applications • Electromagnetic transients, overvoltages and insulation coordination for power systems • Generation and measurement of high voltages (AC, DC and impulse voltages) • Generation and measurement of impulse currents • Dielectric measurements • Partial discharges

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of this course is to introduce undergraduate students to the theory, the applications and laboratory techniques of the broad field of High Voltage Engineering. Undergraduate students attending and completing successfully the "High Voltage Engineering I" course will be able to: • Comprehend and identify high voltage engineering applications. • Comprehend and identify the causes of overvoltages in electric power systems, the process of insulation coordination, as well as overvoltage protection equipment and techniques. • Comprehend the basic principles of high voltage and impulse current laboratory generation and measurement techniques. • Comprehend the basic principles of laboratory measurements associated with dielectrics and partial discharges. • Employ up-to-date techniques and tools in high voltage engineering problems and applications. • Simulate the steady state of power systems, as well as power system transients. • Cooperate with other students in the context of semester projects. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies. • Individual/Independent work • Group/Team work • Development of free, creative and inductive thinking

PREREQUISITES	Introduction to Electric Power Systems (MK7)
TEACHING METHODS	- Lecturing (theory and exercises) in the classroom using projector - The course is supported by the UOWM Open eClass platform - Laboratory exercises on the simulation of the steady state and electromagnetic transients in power systems - Laboratory exercises on high voltage generation and measurement

ASSESSMENT METHODS	Language of evaluation: Greek - Laboratory exercises with team projects (40%) - Final examination (60 %) Final examination: Short-answer questions, Comparative assessment of theory elements, Exercise solving Final examination on the specialized software used for the laboratory exercises The evaluation process is: • announced to the undergraduate students during the first lecture and the first laboratory exercise •uploaded to the OWM Open eClass platform
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. E. Kuffel, W. S. Zaengl, J. Kuffel, High Voltage Engineering, Tziola Scientific Publications, 2nd Edition, ISBN: 978-960-418-261-9, 2013 (in Greek) 2. Stathopulos, High Voltage Engineering I, Symeon Publications, ISBN: 960-7888-63-4, 1997 (in Greek) - Additional educational material: 1. K. Schon, High Voltage Measurement Techniques, Springer Nature Switzerland, ISBN: 978-3-030-21770-9, 2019 - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: • IEEE Transactions on Dielectrics and Electrical Insulation • IEEE Transactions on Power Delivery • IEEE Transactions on Electromagnetic Compatibility • Electric Power Systems Research • Journal of Electrostatics • High Voltage

ELECTRO HYDRAULIC AND ELECTROPNEUMATIC POWER SYSTEMS

COURSE UNIT CODE	EEH19
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY126/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bouhouras A.

COURSE CONTENTS	The course constitutes an introduction to Hydraulic and Pneumatic Systems Analysis and Application. The course examines the advantages of such systems in regard to electrical ones and analyzes the basic circuit components of hydraulic and pneumatic systems. Some basic circuits are analyzed in theory and their functional characteristics are fully explained via respective exercises. The laboratory circuits are analyzed via appropriate software simulations. The latter is implemented by the Automation Studio v5.0 software package for the simulation of a series of pneumatic and hydraulic circuits along with control capabilities regarding their operation. Students are expected to attend demonstrations about basic and circuits and in turn, to be able to structure circuits and analyze their operational behavior. After each lab exercise, every student is expected to deliver a completed document form which will contain the detailed description of the circuit operation along with various measurements describing its operational characteristics. Furthermore, attention is given in the design of hydraulic and pneumatic systems for real applications. The course consists of the following main topics: 1. Hydraulic power systems • Hydraulic fluids • Hydraulic fundamental principles • Hydraulic pumps, motors, actuators • Various power and control valves and other control elements • Other hydraulic elements Proportional hydraulics • Applications 2. Pneumatic power systems • Fundamental principles • Pneumatic actuators, motors, compressors • Circuits and applications • Electrical control • Simulate pneumatic control systems 3. Electric Control • Simple electric control with switches and contacts • Control with PLC 4. Design and simulation of control circuits in hydraulic and pneumatic power applications

LEARNING OUTCOMES / GENERAL COMPETENCES	After successfully completing this course, students will be able to: Recognize and describe the basic hydraulic and pneumatic circuit components • Understand and explain the basic principles of the hydraulic systems • Evaluate the benefits and drawbacks of the hydraulic and pneumatic systems in comparison to electric systems • Implement laboratory circuits and analyze their operation • Simulate and explain the operation of hydraulic and pneumatic circuits. Measure properly all the operational characteristics of the circuit • Design and analyze hydraulic and pneumatic power circuits •Design the control schemes and electric circuits (basic or PLC) for various controls in hydraulic and pneumatic power systems • Design control systems for hydraulic and pneumatic circuits and define the nominal values of the circuit components for real applications General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Decision-making • Project planning and management • Development of free, creative and inductive thinking • Development of new research ideas
PREREQUISITES	-
TEACHING METHODS	Face-to-face Distance learning availability

ASSESSMENT METHODS	The language of evaluation is Greek. The overall rating is divided as follows: - Laboratory exercises (30%) - Written work (30%) - Final exams (40%) consisting of: 1) problem solving 2) short-answer questions 3) multiple choice tests The laboratory exercises are based on the analysis of a circuit-case study through a software tool. The essay writing is based either on the literature review for the development of a topic description work based on scientific publications, or on the development of algorithms and methodologies for solving research problems for innovative research actions on Hydraulic and Pneumatic Power Systems The course examination process includes short answer questions and solving tutorial exercises. The answers of the exam questions are posted in eclass, and the grade of each subject in which they are evaluated is known in advance to the students. Each student can request a demonstration of the writing and his / her grade will be analyzed.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Andrew Parr, Hydraulic and Pneumatic Systems, Code Eudoxus: 94688941 2. Th. N. Kostopoulos – Hydraulic and Pneumatic power systems, Symeon publications, ISBN:978-960-7888-97-6, Code Eudoxus: 50658650. 3. A. Routoulas, Hydraulic and Pneumatic power systems – applications, Sychrnoni Ekdotiki publications, ISBN: 978-960-6674-26-6, Code Eudoxus:16083.

POWER ELECTRONICS II

COURSE UNIT CODE	EEH7
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY125/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Oureilidis K.
COURSE CONTENTS	The course of Power Electronics II consists of the following sections: 1. DC-DC converters: Basic circuits (step-down, step-up, buck-boost), other circuits (Cuk, fly-back). Analysis, design, applications. 2. Switching DC power supplies: Converters with isolation (flyback, forward, push-pull), half- and full-bridge converters, control, power factor correction, design. 3. DC-AC converters (inverters): Single-phase, three-phase, harmonic resolution, square-output inverters, amplitude and harmonic control, multi-level inverters, pulse amplitude inverters, sinusoidal PWM, applications.

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of the course is to introduce the student to the theory and applications of power electronics systems. The second part mainly studies DC-DC converters and DC-AC converters. Upon successful completion of the course, the student will be able to: • Explain in detail the basic functions of the types of power converters examined in the 1st part of the lesson; • Compare and evaluate the individual circuits of each class of power converters; • Implement experimental equipment in the laboratory on DC-DC converters and DC-AC inverters and analyzes their operation; • Simulate and explain the operation of basic DC-DC and DC-AC power converters; • Design power converter circuits belonging to the categories of DC-DC and DC-AC converters; • Design MOSFET-IGBT drive circuits, as well as snubbers circuits and cooling systems; • Collaborate with his fellow students to prepare teamwork essays. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Autonomous work • Teamwork • Project planning and management • Critical thinking
PREREQUISITES	Power Electronics I
TEACHING METHODS	• Teaching in the classroom with a video projector and tutorial exercises • Laboratory exercises • Possibility of modern distance education
ASSESSMENT METHODS	- Laboratory exercises with teamwork (25%) - Individual work in the design / analysis of inverters using and simulations (35%) - Final exams (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Mohan Ned, Undeland Tore A., Robbins William P. 2010, Introduction to Power Electronics, A. Tziola & Sons O.E. Publications 2. M. Rashid, 2010, Power Electronics, ION Publications. 3. Mania St., 2017, Power Electronics, Kalamara Elli Publications 4. D. Hart, 2011, Introduction to Power Electronics, Prentice Hall Publications - Recommended Article/Paper Resources: 5. IEEE Transactions on Power Electronics 6. IET Power Electronics

SPECIAL TOPICS OF ELECTRIC POWER SYSTEMS

COURSE UNIT CODE	EEH20
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY123/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Christoforidis G.

COURSE CONTENTS	The course consists of the following main topics: 1. Operation of Transmission Networks (Weeks 1-3) • DC power flow, optimal power flow, optimal sting of PMUs 2. FACTs (Week 4) • Types of available FACTs, power transfer, AC power flow calculations with FACTs 3. DC power systems (Week 5) • DC power transfer with converters 4. Transmission system reliability and interruptions (Week 6) • reliability indices, reliability improvement, power interruptions in transmission networks 5. Operation of distribution networks (Weeks 7-8) • current status and transition towards the Smart Grid concept, ancillary services of distribution network to transmission systems • central and distributed siting of ESSs 6. Distribution networks with DG (Weeks 9-10) • optimal sizing and siting of DGs and RESs in distribution networks, penetration of EVs and their impact on distribution network 7. Optimal management of distribution networks (Week 11) • automation upgrade in distribution networks, energy billing, network reconfiguration of distribution networks, distribution network expansion 8. Distribution network reliability (Week 12) • reliability and unreliability indices, reliability improvement, power outages and power restoration schemes in distribution networks 9. Power quality (Week 13) • power quality issues (harmonics, voltage drop, flicker etc.), origin of power quality issues and ways to deal with them, standard IEC 50160

LEARNING OUTCOMES / GENERAL COMPETENCES	After successfully completing this course, students will be able to: 1. Perform DC load flow and optimal power flow analysis 2. Understand the benefits and drawbacks for either AC or DV power transmission, know and analyze the characteristics of flexible power systems (FACTs) 3. Evaluate the reliability level of both transmission and distribution networks by computing the respective reliability indices 4. Understand the impact of DG and RES penetration on distribution networks – have knowledge about the raised issues due to EVs penetration and ESS installation 5. Be aware of the current trend regarding the operational status of transmission and distribution networks both on control schemes and equipment upgrade 6. Solve optimization problems regarding the upgrade and expansion of power networks, know the reconfiguration scheme of distribution networks towards the improvement of the operational characteristics 7. Identify power quality issues in power systems and apply methodologies to deal with them
PREREQUISITES	• Transmission and distribution of electric energy
TEACHING METHODS	- Lectures (PowerPoint slides via projections) and tutorials - Learning process support via e-class platform - Laboratory exercises (software simulations)
ASSESSMENT METHODS	- Individual or group assignment (30%) - Laboratory exercises (30%) - Final exams (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Ανάλυση Συστημάτων Ηλεκτρικής Ενέργειας, Βοβός Α. Νικόλαος, Γιαννακόπουλος Β. Γαβριήλ 2. Αναλυση Συστηματων Ηλεκτρικης Ενεργειας, Grainger/ Stevenson 3. Modern transmission and distribution networks, P. Goergilakis, Code Eudoxos [320144]

ELECTROMECHANICAL INSTALLATIONS AND ENERGY ANALYSIS OF BUILDINGS

COURSE UNIT CODE	EEH14
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY129/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Stimoniaris D.
COURSE CONTENTS	1. Thermal insulation and Thermal losses of buildings. 2. Building materials and building components - Thermal resistance and heat permeability - Calculation method. 3. Heating, cooling and air conditioning systems in buildings - Methods for calculating the thermal / cooling load design. 4. Energy Efficiency of Buildings (Methodology for elaboration of calculations of the energy efficiency of a building in accordance with the requirements and specifications of the legislation and the Regulation of Energy Efficiency of Buildings – KENAK. 5. Fire safety (active and passive fire protection). 6. Lifts (hydraulic / electric). 7. Pumping stations.

LEARNING OUTCOMES / GENERAL COMPETENCES	This course provides the basic knowledge and techniques for the preparation of studies of electromechanical installations of buildings and proposes methods for the correct and safe dimensioning of devices - applications of electricity in accordance with applicable standards and national regulations, with the development of issues related to professional rights. of the graduates of the department. Upon completion of the course the student should: • Effectively implements regulations and standards regarding the requirements for the electromechanical installations of buildings. • Effectively implements the regulations and the current standards regarding the safe dimensioning of the devices - applications of electricity. • Handles technical software packages, which are widely used in the preparation of studies of electromechanical installations and energy efficiency of buildings. • Has the theoretical background to prepare and compile E / M studies of facilities related to • the course material.
PREREQUISITES	-
TEACHING METHODS	- Classroom teaching and tutoring exercises. - Learning process support through e-class. - Specialized Software (energy efficiency of buildings, etc.).
ASSESSMENT METHODS	I. Written final exam (35%) which includes: - Multiple choice questions. - Questions for understanding the basic concepts of the course - Problem solving-exercises. II. Group work (15%) on the analysis of a complete case study. III. Individual work in the laboratory (20%). IV. Final laboratory test (30%).
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. ΗΛΕΚΤΡΟΛΟΓΙΚΕΣ ΚΑΙ ΜΗΧΑΝΟΛΟΓΙΚΕΣ ΕΓΚΑΤΑΣΤΑΣΕΙΣ ΣΕ ΚΤΙΡΙΑ, Σ. ΚΟΥΡΗΣ, Β.ΣΩΤΗΡΟΠΟΥΛΟΣ

ENERGY ECONOMICS AND ENERGY MARKETS

COURSE UNIT CODE	EEH10
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE371/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	

COURSE CONTENTS	The theoretical part of the course provides an overview of the power systems at national and pan-European level, while also includes lectures related to energy economics, types of electricity markets, and current challenges in the energy sector. Tutorials and exercises include representative types of problems related to the operation and the clearing of electricity markets. Laboratory courses aim to teach the GAMS (General Algebraic Modeling System) software. In the field of energy economics and energy markets, the use of optimization techniques and mathematical programming is well-established. Indicatively, mathematical models can be used in order to determine optimal long-term energy road maps at national and/or regional levels as well as to simulate and analyze the operation and clearing of energy markets on a daily and/or annual scale. In summary, the course aims to cover the following topics: • Energy and international relations, security of energy supply, interactions between energy sector, economy and environment. • Teaching the basic principles of energy markets by examining the Greek and the European energy market. • Unit commitment and optimal dispatch of generation units. • Power systems with high penetration levels of distributed renewable energy sources. • Long-term energy planning (current reality and future challenges). • Overview of the key features of Greek and European energy policies by focusing on the power systems of Greece and Southeast Europe and by presenting the main features of the most advanced power systems of Europe (most advanced in terms of high penetration levels of distributed renewable energy sources).

LEARNING OUTCOMES / GENERAL COMPETENCES	The main objective of the course is to examine and analyze concepts related with energy economics and energy markets. Upon successful completion of the course, the student will be able to: • Know the basic technologies for energy production and the basic sectors of energy consumption. • To understand the key challenges of modern energy sector and the impact of the energy economics on the energy environment. • To understand and analyze the key economic attributes related to the planning and operation of power systems. • Know the structure and the operation of energy markets. • Understand the basic features of the Greek and European energy markets. • Understand the short-, medium-, and long-term operation of electricity markets. • Model, simulate and analyze, using optimization tools and software, common problems related with energy economics, energy policies, and energy markets. • Estimate the financial viability of energy investments. • Understand the current state as well as the future challenges of the energy sector on a national and European level.
PREREQUISITES	-
TEACHING METHODS	- Teaching via video projector - Support of learning process through the e-class platform - Use of the General Algebraic Modeling System (GAMS) tool - Use of the Long-range Energy Alternatives Planning System (LEAP) tool - Tutorial and workshops for the teaching of optimization applications in power systems.
ASSESSMENT METHODS	- Groups assignments (50 % of the final grade) - Final examination (50 % of the final grade) The exams include: a) multiple-choice questions or right-wrong type questions, b) developmental questions, and c) exercises related to the basic concepts of the course.
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. E. Lekatsas, "Economic analysis of electrical systems", Technical Chamber of Greece, Athens, Greece, 2000 2. A. Bakirtzis, "Economic operation of electricity systems", Ziti Publications, Thessaloniki, Greece, 1998 3. C. Harris. "Electricity markets, pricing, structures and economics", John Wiley & Sons Inc.: West Sussex, UK, 2006 4. S.C. Bhattacharyya, "Energy Economics: Concepts, Issues, Markets and Governance", Springer-Verlag, London, UK, 2011 - Recommended Article/Paper Resources: 1. IEEE Transactions on Power Systems 2. IEEE Transactions on Power Delivery 3. Electric Power System Research

9TH SEMESTER – DIVISION OF ENERGY

INDUSTRIAL ELECTRICAL INSTALLATIONS

COURSE UNIT CODE	YEH5
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY128/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Bouhouras A.
COURSE CONTENTS	The course consists of the following main topics: • Low Voltage and Medium Voltage installations grounding (types of grounding systems, measurement of grounding resistance) • Calculation of short circuit currents and power • Analysis of motor installations (asynchronous motor start-up, motor breaking, choosing the right motor, electrical characteristics of motors, defining motor's load, protection and connection of motors) • Medium voltage substations (coupling equipment, means of protection, types of substations, substation grounding,) • Feasibility study for substations, reactive power compensation (electricity billing, improving power factor) • Lightning protection of buildings and installations (surge arresters, special protection) • Switches (relays, load switches, sectionalizers, fuses) • Lighting installations (types of lamps, lighting installation studies)

LEARNING OUTCOMES / GENERAL COMPETENCES	After successful completion of the course, students will be to: • Choose of materials, cables and appliances industrial electrical installations from technical catalogues companies and analysis of these characteristics. • Study of integrated industrial installations simple and automated production of specific units of the industry. • Study and calculations supporting regional facilities in industrial facilities. • Perform earthing and lightning analysis in industrial buildings. • Perform outdoor lighting analysis in industrial buildings. • Perform reactive power compensation and selecting invoices from their suppliers of electricity (electricity and individuals) for industrial use. • Study and perform calculations of electrical industrial automation panels for use on individual machines and production cooperation with these main electrical panels feeding an industrial installation. • Know the standards and regulations for industrial electrical installations. • Know how to protect from industrial accidents. • Know about low and medium voltage consumers' substations. • Study saving electricity and other energy sources in industrial plant. General Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Decision-making • Group/Team work • Project planning and management • Development of free, creative and inductive thinking • Development of new research ideas
PREREQUISITES	• Modern Electric Power Systems
TEACHING METHODS	Face-to-face Distance learning availability

ASSESSMENT METHODS	The language of evaluation is Greek. The overall rating is divided as follows: - Laboratory exercises (30%) - Written work – essay presentation (30%) - Final exams (40%) consisting of: 1) problem solving 2) short-answer questions 3) multiple choice tests The laboratory exercises are based on the analysis of a circuit-case study through a software tool and practical work with hardware equipment. The essay concerns a complete study for a case of industrial application. The course examination process includes short answer questions and solving tutorial exercises. The answers of the exam questions are posted in eclass, and the grade of each subject in which they are evaluated is known in advance to the students. Each student can request a demonstration of the writing and his / her grade will be analyzed.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. V. Bitzionis, Industrial electrical installations, Tziola Publications, Code Eudoxus: 41958897 2. S. Touloglou, Industrial electrical installations and Medium Voltage Substations, Code Eudoxus: 14582 3. P. Dokopoulos, Electrical installations for consumers, Ziti publications, Code Eudoxus: 11044 Relevant scientific journals: • IEEE Transactions on Power Systems • IEEE Transactions on Smart Grid • Electric Power System Research (Elsevier)

ELECTRIC DRIVE SYSTEMS

COURSE UNIT CODE	EEH11
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=150
TEACHING WEEKLY HOURS	4
INSTRUCTOR	K. Oureilidis
COURSE CONTENTS	The course consists of the following main topics: I. Introduction to Electric Drive Systems (EDS) a. Description, requirements of classic and modern EDS b. Parameters influencing the selection of an EDS c. Movement profile d. Torque-speed characteristics of mechanical loads II. DC motor drives a. Control of field magnetic flux b. Control of stator voltage c. Control of rotor resistance d. Power electronics control i. Rectifiers ii. Dc-Dc converters III. AC motor drives a. Change in stator voltage b. Frequency control c. Change in rotor resistance d. Rotor voltage injection e. Slip energy recovery f. Voltage/frequency control g. Power electronics control i. Inverters ii. AC controllers IV. Braking of Electric Motors

LEARNING OUTCOMES / GENERAL COMPETENCES	Scope of the course is to introduce the students into the theory and mainly the applications of Electric Drive Systems. The basic electric drive systems and the cooperation between motor-load are examined. The theory behind AC and DC motor control is analyzed. The main methods for controlling DC and AC motors using classical ways and power electronics systems are studied. The student learns to scale and study simple electric drive systems found in industry. On successful completion of this module the student will be able to: • Identify the key parameters for selecting an electric drive system • Know the basic methods for transfer of movement and the characteristics of main loads • Understand and compare the ways of DC motors control • Analyze and design a DC motor drive system • Understand and compare the ways of AC motors control • Analyze and design an AC motor drive system • Acquire practical skills in the laboratory for controlling various types of electric motors • • Know the braking methods of electric motors
PREREQUISITES	• Power Electronics I and II, Electrical Machines I and II
TEACHING METHODS	- Lectures (PowerPoint slides via projections) and tutorials - Learning process support via e-class platform - Laboratory exercises
ASSESSMENT METHODS	- Individual assignment (40%) - Group assignment in the laboratory (30%) - Final examination (30%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Π. Μαλατέστας, Ηλεκτρική Κίνηση, Εκδόσεις Τζιόλα, 2010. 6. Krishnan, Ηλεκτρικά Κινητήρια Συστήματα,Κλειδάριθμος 2009 7. M. El Sharkawi, Fundamentals of Electric Drives, Brooks, 2000.

COURSE UNIT CODE	EEH21
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY102/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Nouslidis
COURSE CONTENTS	• Transient phenomena in power systems (wave phenomena in transmission lines, traveling waves, etc.) • Couplings, disconnections and short circuits in power systems (connections and disconnections of single- and three-phase loads) • Steady-state and transient stability (dynamics of synchronous machines, equal area criterion) • Analysis of short circuits (IEC 60909, symmetrical and asymmetrical short circuits, calculation of currents and voltages of the faulted node, numerical methods for short circuit analysis) • Power system protection (general concepts, selectivity, types of relays, operating principles of electromechanical relays, line protection with distance / overvoltage relays and fuses, etc.)
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, the student shall be able to: • Understand the termination of transmission lines, analyze the stress of power transformers and insulators from traveling waves • Compute over-voltages and over-currents, caused either due to connection/disconnection of power system components or due to short circuits • Analyze symmetrical and asymmetrical short circuits • Assess power system transient stability using the equal area criterion General Competences: • Decision making • Group work

PREREQUISITES	• Transmission and distribution of electrical energy
TEACHING METHODS	• Face to face • Distance learning
ASSESSMENT METHODS	Course evaluation is carried out through intermediate exams (it constitutes 30% of the final grade) and a final exam (constitutes 70% of the final grade). Exams include: a) multiple choice questions or right-wrong type questions, b) open-ended and short-answer questions and c) exercises related to the basic concepts of the course
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Ν. Βοβός, Γ. Γιαννακόπουλος, "Έλεγχος και ευστάθεια συστημάτων ηλεκτρικής ενέργειας", 2017, Κωδικός Εύδοξος: 68379841 2. Ν. Βοβός, "Προστασία συστημάτων ηλεκτρικής ενέργειας", 2009, Κωδικός Εύδοξος: 59384925 3. Prabha Kundur, "Ευστάθεια και έλεγχος συστημάτων ηλεκτρικής ενέργειας", 2019, Κωδικός Εύδοξος: 11446 - Recommended Article/Paper Resources: IEEE Transactions on Power Systems IEEE Transactions on Power Delivery Electric Power System Research

OPTIMIZATION METHODS IN ELECTRIC POWER SYSTEMS

COURSE UNIT CODE	EEH13
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE376/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	P.Gaidatzis

COURSE CONTENTS	The General Algebraic Modeling System (GAMS) is a computational modeling tool for solving various mathematical programming and optimization problems. The purpose of the course is to present the main optimization problems associated with the modeling of energy systems and in particular, power systems, both in their theoretical formulation (objective function, equations constraints), as well as in the computational methods and techniques used to solve them (modeling in GAMS modeling tool). The course introduces undergraduate students to the applied optimization with a focus on energy systems. It includes the mathematical formulation of a series of problems related to energy systems and the laboratorial part of the course their computational modeling in the General Algebraic Modeling System (GAMS). More specifically, the subjects covered are: • Linear Programming, Quadratic Programming, Mixed Integer Linear and Nonlinear Programming, • Economic dispatch problem including thermal power units and renewable energy sources (static and dynamic formulation), • Unit commitment problem, • Long-term generation expansion planning of power systems, • Optimal planning and production scheduling of distributed energy resources • Impacts of electric vehicles' penetration and energy storage systems.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, the student will be able to: • Understand the basic principles of programming in a computing environment. • Understand the computational applications of modern energy applications and the added value of optimization in decision making. • Be able to provide mathematical formulations for the energy systems problems. • Be able to understand the short-term dynamics of the operation of electricity markets, as well as the medium- and long-term dynamics of energy planning. • Formulate, model, and solve in a computational optimization tool the main problems of energy policy, economy, and energy markets.
PREREQUISITES	-
TEACHING METHODS	• Onsite learning • Option of Modern distance learning courses
ASSESSMENT METHODS	• Laboratory exercises in groups (30%) • Individual project for modeling an energy systems optimization problem (30%) • Final exams (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Power System Optimization Modeling in GAMS [electronic resource], Alireza Soroudi, Code Eudoxos: 754908 2. Nonlinear Optimization Applications Using the GAMS Technology [electronic resource], Neculai Andrei, Code Eudoxos: 73248321 3. Continuous Nonlinear Optimization for Engineering Applications in GAMS Technology [electronic resource], Neculai Andrei, Code Eudoxos: 75483709 4. Optimization of Processes and Systems with Applications in MATLAB and GAMS, Ioannis Koukos – Apostolos Koutinas, Code Eudoxos: 32997464

Introduction to Smart Grids

COURSE UNIT CODE	EEH15
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY114/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	A. Bouhouras

COURSE CONTENTS	1. Introduction to Smart Grids, • Introductory remarks, terms and definitions, • Regulatory framework • Smart grid concepts 2. Smart Grid elements, • Smart Grid Architecture • Operational monitoring and measurements • Connectivity and standards 3. Smart Grid communications, • Management systems of distribution and transmission systems • Communication Requirements in the face of Distributed Generation and microgrids • Advanced SCADA systems • Data Analysis 4. Smart Grid security • Motives • Weaknesses • Requirements for security and privacy • Cyberattacks definitions, technical characteristics and counter-measures 5. Flexibility in Smart Grids • Generation Flexibility • Load Flexibility • Active Distribution Networks 6. Latest trends in Smart Grids • Smart Buildings • E-mobility • Energy Storage Systems 7. Generation/Consumption Forecasting • Load Forecasting techniques • Generation Forecasting techniques • Variable time horizons 8. Case studies and Tools • Peer-to-peer and other transactions in smart grid electricity markets • Microgrids • Local Energy communities

LEARNING OUTCOMES / GENERAL COMPETENCES	With the completion of this course the student: • Will have grasped the fundamental concepts and characteristics of the smart grids. • Will be familiarized with modern smart grids subjects, such as, cybersecurity, flexibility. • Will be able to identify and analyze smart grid architecture • Will be able to describe and analyze issues such as forecasting of energy generation and consumption, as well as peer-to-peer transactions, blockchain integration in power systems etc. • Will become familiar with the concepts of microgrids, Virtual Power Plants and Local energy communities.
PREREQUISITES	• Transmission and Distribution of Electrical Energy, Stability of Power systems, Renewable Energy Sources, Power electronics, Electricity Market,
TEACHING METHODS	1. Physical sessions 2. Possibility of remote training sessions
ASSESSMENT METHODS	The assessment method adopted in this course will be two-fold: 1. Written exam comprising 70% of the final course grade, consisting of: multiple-choice tests, short-answer questions and problem solving. 2. Written work, essay/report, oral exam, presentation comprising 30% of the final course grade. The students will be evaluated according to the content as well as the presentation of their work.
LANGUAGE OF INSTRUCTION/EXAMS	Greek, English

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Borlase, S (Ed.) (2017). Smart Grids: infrastructure, technology and solutions. CRC press 2. Uslar, M., Specht, M., Danekas, C., Trefke, J., Rohjans, S., Gonzalez, J. M, … & Bleiker R. (2013). Standardization in smart grids: introduction to IT-related methodologies, architectures and standards. Berlin/Heidelberg, Germany: Springer. 3. Fadlullah, Z. M. & Kato, N. (2015). Evolution of Smart Grids, Springer International Publishing. 4. Buchholz, B. M., & Styczynski, Z. (2020). Smart Grids. Springer Berlin Heidelberg. 5. Xiao, Y. (2012). Communication and networking in Smart Grids. CRC press. 6. Boroojeni, K. G. Amini, M. H., & Iyengar, S. S. (2017). Smart Grids: Security and privacy issues. International Publishing, 2017. - Recommended Article/Paper Resources: IEEE Transactions on Smart Grids IEEE Transactions on Power Systems IEEE Transactions on Power Delivery IEEE Power & Energy Magazine

Energy Storage Technologies

COURSE UNIT CODE	EEH16
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY112/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Nouslidis
COURSE CONTENTS	Course contents: • Introductions. Importance of energy storage systems in modern power systems • Electromechanical storage (pumped hydro storage systems, compressed air energy storage systems, flywheels) • Electromagnetic and electrochemical storage systems (batteries, supercapacitors, super magnetic energy storage systems, fuel cells, flow batteries) • Comparative assessment of energy storage technologies. Energy density, power density, efficiency, lifetime, cost, viability • Sizing of battery storage systems • Practical examples and study cases In the laboratory part, special software is used for the dimensioning of storage systems. Moreover, the laboratory infrastructure of the Department (including superconducting energy storage system, electronic load for battery control, PV system with battery storage) is used to demonstrate basic principles.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, the student shall be able to: • Understand the differences on main energy storage technologies and analyze their individual characteristics • Understand the importance of energy storage in modern power systems • Compare and evaluate energy storage technologies based on their cost and individual characteristics • Model energy storage systems and perform simulations in software environment • Analyze storage applications and the individual advantages of each storage technology • Design battery storage energy systems
PREREQUISITES	-
TEACHING METHODS	• Face to face • Distance learning
ASSESSMENT METHODS	- Laboratory exercises with group reports (30% of the final grade) - Individual project -dimensioning of storage systems- (30% of the final grade) - Final exams (40% of the final grade)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Βιβλίο [59385727]: Συστήματα παραγωγής ηλεκτρικής ισχύος από ανανεώσιμες πηγές ενέργειας, Gilbert M. Masters 2. Βιβλίο [94645169]: Σταθμοί Παραγωγής Ηλεκτρικής Ισχύος, Πολυζάκης Απόστολος - Recommended Article/Paper Resources: Journal of Energy Storage

HIGH VOLTAGE ENGINEERING II

COURSE UNIT CODE	EEH22
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	-
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Z. Datsios
COURSE CONTENTS	The contents of the “High Voltage Engineering II” course are: • High voltage engineering applications in power systems: - Insulators - High voltage power cables - Circuit breakers, disconnectors - Gas Insulated Lines (GIL), Gas Insulated Substations (GIS) - High voltage capacitors and inductors • Lightning: mechanism, effects, surge protection • Grounding systems for high voltage installations and associated measurements • Electrical breakdown in gaseous, liquid and solid dielectrics • Surface flashover • Vacuum breakdown • Electric arc

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of this course is to introduce undergraduate students to the applications of High Voltage Engineering and the physical mechanisms related to electrical breakdown. Undergraduate students attending and completing successfully the "High Voltage Engineering II" course will be able to: • Comprehend and identify high voltage engineering applications with emphasis in electric power systems. • Comprehend the mechanism of lightning, the effects of lightning on power systems, as well as the basic principles of lightning protection. • Comprehend and apply the basic principles of grounding. • Comprehend the physical mechanisms related to electrical breakdown • Employ up-to-date techniques and tools in high voltage engineering problems and applications. • Simulate the steady state of power systems, as well as power system transients. • Perform field measurements of soil resistivity and ground resistance. • Perform laboratory tests for the evaluation of the dielectric strength of insulating oils. • Cooperate with other students in the context of semester projects.
PREREQUISITES	-
TEACHING METHODS	- Lecturing (theory and exercises) in the classroom using projector - The course is supported by the UOWM Open eClass platform - Laboratory exercises on the simulation of the steady state and electromagnetic transients in power systems - Laboratory exercises on field measurements of soil resistivity and ground resistance and on the evaluation of the dielectric strength of insulating oils

ASSESSMENT METHODS	Language of evaluation: Greek - Laboratory exercises with team projects (40%) - Final examination (60 %) Final examination: Short-answer questions, Comparative assessment of theory elements, Exercise solving Final examination on the specialized software used for the laboratory exercises The evaluation process is: • announced to the undergraduate students during the first lecture and the first laboratory exercise •uploaded to the OWM Open eClass platform
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: [1] M. G. Danikas, Elements of High Voltage Engineering, Herodotus Publications, 3rd edition, ISBN: 978-960-485-305-2, 2019 (in Greek) [2] I. Stathopulos, High Voltage Engineering I, Symeon Publications, ISBN: 960-7888-63-4, 1997 (in Greek) - Additional educational material: A. Küchler, High Voltage Engineering, Springer Vieweg, ISBN: 9783642119934, 2018 - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: IEEE Transactions on Dielectrics and Electrical Insulation IEEE Transactions on Power Delivery IEEE Transactions on Electromagnetic Compatibility Electric Power Systems Research Journal of Electrostatics High Voltage

SELECTED TOPICS IN POWER ELECTRONICS

COURSE UNIT CODE	EEH23
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY115/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Oureilidis K.
COURSE CONTENTS	The course of Selected Topics in Power Electronics consists of the following sections: 1. Control of DC-DC converters and switching DC power suppliers: Feedback circuits and small-signal analysis, power factor correction, state-space averaging equations. 2. Drive circuits & snubbers: Semiconductor drive circuits (MOSFET-IGBT, Thyristor), snubber circuits, thermal semiconductor management and heat sinks. 3. Resonant converters: ZCS, ZVS, series, parallel, combinatorial. Comparative assessment.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course the student will be able to: • Analyze the dynamic operation of DC-DC converters; • Design control systems of DC-DC converters and switching DC power suppliers; • Design drive circuits of MOSFET, IGBT and Thyristors; • Compute and select snubbers circuits to protect switches; • Identify the appropriate cooling systems for the switches; • Know, analyze and compare resonant converters; • Simulate and explain the operation of special converters and power electronics systems; • Collaborates with fellow students in order to prepare teamwork essays.
PREREQUISITES	Power Electronics I, Power Electronics II

TEACHING METHODS	• Teaching in the classroom with a video projector and tutorial exercises • Laboratory exercises • Possibility of modern distance education
ASSESSMENT METHODS	- Laboratory exercises with teamwork (25%) - Individual work in the design / analysis of inverters using and simulations (35%) - Final exams (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Mohan Ned, Undeland Tore A., Robbins William P. 2010, Introduction to Power Electronics, A. Tziola & Sons O.E. Publications 2. M. Rashid, 2010, Power Electronics, ION Publications. 3. Mania St., 2017, Power Electronics, Kalamara Elli Publications 4. D. Hart, 2011, Introduction to Power Electronics, Prentice Hall Publications - Recommended Article/Paper Resources: IEEE Transactions on Power Electronics IEEE Transactions on Industrial Electronics IEEE Transactions on Industry Applications IET Power Electronics Power Electronics (MDPI)

PV SYSTEMS AND APPLICATIONS

COURSE UNIT CODE	EEH23
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY132/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	G. Christoforidis
COURSE CONTENTS	• Autonomous and grid-connected PV systems • Grid Connection methods • problems with grid connected large PV systems • Islanding: operation, avoidance and exploitation • Calculation of estimated generation and parameter impact assessment. • Design and Selection of suitable equipment • Suitability & advantages of next generation inverters • PV systems applications: Rooftop PV system and large PV plants. • Impact of consumption on prosumers • Forecasting • Current policies and regulations • Hybris systems including Storage. Topologies and equipment. • Techno-economic analysis and feasibility studies.

LEARNING OUTCOMES / GENERAL COMPETENCES	With the completion of this course the student will be able to: • Calculate the estimated generation of a PV system, taking into consideration all the necessary parameters • Identify and explain all the possible connections of a PV system with the rest of the grid • Be aware of current policies and regulations framing the PV operation and participation in the electricity market. • study simple PV systems to be connected to the rest of the grid, or operate autonomously. • Design simple PV systems including suitable PV modules, inverters and their optimized topology. • Analyze PV systems integrated with energy storage systems • Investigate financial feasibility of such systems. • Learn and use related software • Cooperate with other students in team projects.
PREREQUISITES	Transmission and Distribution of Electrical Energy, Renewable Energy Sources, Power electronics
TEACHING METHODS	Physical sessions for lectures, lab exercises
ASSESSMENT METHODS	Individual project in study and design a PV system (100%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book RECOMMENDED BIBLIOGRAPHY: 1. Paulescu, M., Paulescu, E., Gravila, P., & Badescu, V. (2013). Weather modeling and forecasting of PV Systems operation (Vol. 358). London: Springer. 2. Pearsall, N. (Ed.) (2016). The Performance of photovoltaic (PV) systems: modelling, measurement and assessment. Woodhead Publishing. - Recommended Article/Paper RECOMMENDED BIBLIOGRAPHY: Journal of Renewable Energy (Elsevier) IEEE Transactions of Sustainable Energy IET Renewable Power Generation

7TH SEMESTER – DIVISION OF TELECOMMUNICATIONS AND NETWORKS

ANALYSIS AND SIMULATION OF COMMUNICATION NETWORKS

COURSE UNIT CODE	Y2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE175/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Sarigiannidis P.
COURSE CONTENTS	Basic Simulation Modelling. Systems, Models and Simulation. Different simulation types. Monte Carlo Simulation. Queueing system simulation. Modeling complex systems. Simulation Software (Matlab, ns-2/3, Opnet, OmNET ++, NetSim). Selecting input probability distributions. Generating random numbers and random variates. Statistical analysis of simulation output: Means, variances, confidence intervals etc). Simulation of Communication Systems and Networks. Verification, validation, and accreditation through Simulation.

LEARNING OUTCOMES / GENERAL COMPETENCES

Upon completion of this course, on knowledge level, students will:

- Gain knowledge and broad understanding of topics in the areas of analysis, modelling, and simulation of communication networks, as well as in the area of event-driven programming.
- Be able to identify and describe problems through the Monte Carlo modelling approach and solve real-world problems using event-driven simulation. Moreover, students will be able to identify the prerequisites of applying randomness to simple and complicated problems by leveraging the theory of large numbers and the use of methods of pseudo-random number generation.

Upon completion of this course, on skills level, students will:

- Be able to comprehend, explain, and infer in terms of entities, input and output variables, performance metrics, constants, and other critical factors of simulation techniques. They will also be to identify the required evaluation variables, the limits of the performance metrics, and the required simulation time for the correct generation of results and conclusions.
- Be able to autonomously solve simple and complicated problems using event-driven simulation and verify the simulation results using analytical methods, such as probability theory and large number theory. Furthermore, students will be able to interpret the related elements that will enable the generalization of the conclusions during the problem-solving in order to publish and disseminate information, ideas, and conclusions to an inexpert audience.

Upon the completion of this course, on competencies level, students will:

- Be able to manage complicated techniques, effective methodologies, solution strategies, and professional activities by assuming responsibility for the decision-making through event-driven simulation. They will be able to simulate simple and complicated problems through a wide range of simulation platforms such as Matlab, ns-2, ns-3, and OMNeT++. In addition, students will gain the required skills to analyze and simulate problems in unpredictable, heterogeneous, and competitive work environments by assuming responsibility for the management of professional development of persons and teams without risks and costly capital expenditures.
- Leverage their knowledge, comprehension, and problem-solving skills in various applications towards addressing problems in new and unknown environments, that are regulated by interdisciplinary and heterogeneous frameworks, towards exploiting the results that originate from applying event-driven simulation on research, societal, and collaboration levels.

PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance-learning capability
ASSESSMENT METHODS	• Final written examination (60%), Greek • Laboratory exercises (30%) • Presentation of semester assignment (10%) • Oral examination (±20%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. V. Kouikoglou, D. Konstantas, “Simulation of Discrete Event Systems”, 1st ed., I. Mourgos, 2016 2. M. Sfakianakis, “Simulation and Applications”, 1st ed., S. Patakis, 2001 3. M. Roumeliotis, S. Souravlas, “Simulation Techniques”, Tziola, 2011 4. V. Tsaousidis, et al., “Laboratory Exercises on Computer Networks and Internetworks”, Kleidarithmos, 2010 5. A. M. Law, W. D. Kelton, “Simulation Modelling and Analysis”, Mc-Graw-Hill Inc., 1991 - Recommended Article/Paper Resources: 6. J. Burbank, W. Kasch, J. Ward, “An Introduction to Network Modeling and Simulation for the Practicing Engineer (ComSoc Guides to Communications Technologies)”, Wiley-IEEE, 2011 7. M. Guizani, A. Rayes, B. Khan, A. Al-Fuqaha, “Network Modeling and Simulation: A Practical perspective”, Wiley, 2010 8. R. C. Welsh, “GNS3 Network Simulation Guide”, Packt Publishing, 2013 9. A. S. Sethi, V. Hnatyshin, “The Practical OPNET User Guide for Computer Network Simulation”, Chapman and Hall/CRC, 2012.

ANTENNA SYSTEMS AND WIRELESS PROPAGATION

COURSE UNIT CODE	Y3
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE289/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	A. Pitilakis

COURSE CONTENTS	Radiated and guided electromagnetic (EM) waves in the radio wave and microwave spectrum. Basic antenna properties (radiation pattern, directivity and gain, polarization, input impedance, matching and resonance). Wireless propagation principles (reciprocity, Friis equation and RADAR equation). Linear wire antennas (dipoles and monopoles), image theory and effect of conduction ground. Loop antennas (small loop, wavelength-circumference loop). Antenna arrays (analysis and synthesis, broadside, end-fire, and phased arrays). Special wire antennas (folded dipoles, Yagi-Uda, log-periodic antennas). Horn antennas (pyramidal), reflector antennas (flat, angular and parabolic), microstrip and patch antennas. Special antennas and analysis/ design techniques. Lab exercises based on education equipment (Lab Volt/Festo Didactir) for measurement of basic antennas (dipoles, loops, Yagi-Uda, horns, etc.). Wireless propagation channels, signal degradation (path loss, fading, multi-path), wireless link systems and types (terrestrial, mobile/cellular, satellite). Propagation effects (reflection/ refraction, scattering, diffraction). Radio coverage models (link-budget, Friis equation, empirical and physical models, geometric options, LOS/NLOS cases). Models for specific wireless systems: Terrestrial (fixed links), mobile/cellular (macro/micro/pic/femto-cells, cell-size, base-stations, antennas used), satellite, Ad-hoc, Personal/Body Area Network (+SAR). Channel improvement techniques (diversity, smart antennas, distributed systems, repeaters, MIMO).
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to: • Understand basic concepts of simple antennas • Categorize and utilize antennas depending on the application • Design antennas with defined specifications • Understand basic concepts of RF links • Categorize and utilize wireless channels • Design simple RF links and calculate power budget • Recognize real antenna systems and conduct measurements

PREREQUISITES	-
TEACHING METHODS	Lectures, exercises, lab measurement exercises and lab reports.
ASSESSMENT METHODS	Grade from lab reports, 25%, final written exams, 75%. Optional homework assignments.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Μπαλάνης Κ., Θεωρία Κεραιών, 4η εκδ., Παπασωτηρίου, 2019. 2. Kraus J. D., Κεραίες, Εκδοσεις Α. Τζιολα & Υιοι, 1998. 3. Καψάλης Χ., Κωττής Π., Κεραίες ασύρματες ζεύξεις, Εκδοσεις Α. Τζιολα & Υιοι, 2008. 4. Κανάτας Α., Κωνσταντίνου Φ., Πάντος Γ., Ασύρματες Επικοινωνίες, Κανατας Αθανασιος, 2010. 5. Saunders S., Aragón-Zavala A., Κεραίες και διάδοση για ασύρματα συστήματα επικοινωνιών, Εκδ. Πεδιο Α.Ε., 2016.

Digital Communications

COURSE UNIT CODE	E45
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE302/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	The course deals with concepts and techniques that are the basis of communication of all modern (wired and wireless) digital communication systems including fiber optic systems, fifth generation wireless communications and satellite communications. Modern textbooks and teaching techniques are used to transmit the above basic knowledge, as well as a series of well-organized laboratory exercises. The laboratory exercises are accompanied by corresponding laboratory examinations allowing the students to capitalize on the theoretical knowledge and to face practical problems. • Pulse Analogue Configuration. • Sampling Theorem. • Sampling of Bandpass Signals. • TDM multiplexing. • Pulse Width, Pulse Positioning. Digital Pulse Configuration. • Configuration Codes, Memory Configuration Signals. • Pulse coding. • ASK, FSK, PSK, QPSK, MSK, DPSK Configuration Systems. • Trellis Chart. • Maximum Likelihood Detector. • Digital Channel Transmission with Additional Gaussian White Noise. • Inter-Symbolic Noise Interference Phenomenon

LEARNING OUTCOMES / GENERAL COMPETENCES	By successfully passing the course "Digital Communications", students gain proven knowledge and understanding of the following key concepts and topics: • Analysis, design and optimization of telecommunication systems • Performance measures of digital communication systems (error rate, possibility of communication interruption, energy and spectral efficiency, etc.) Upon successful completion of the laboratory exercises, students will be able to: • Use the material part of the laboratory • Develop experimental analog-to-digital and digital-to-analog signal conversion systems, as well as integrated digital communication systems. • Design new digital communication systems • Solve problems within the lab and consider scenarios In this way, they acquire and sharpen critical thinking and understanding around problems related to the subject matter of the course, as well as they can support the solution of relevant problems with arguments, formulate judgments that include reflections on related scientific issues, and communicate conclusions. with clarity and clarity to specialized and non-specialized audiences. In other words, upon successful examination of the course, the student will have the necessary learning skills that allow them to continue their studies in a highly autonomous or autonomous way.
PREREQUISITES	-
TEACHING METHODS	• Lectures • Exercises • Laboratory Exercises
ASSESSMENT METHODS	Written Final Exam (100%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Καραγιαννίδης Γ., Τηλεπικοινωνιακά Συστήματα, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010. 2. J. PROAKIS, M. SALEHI, ΣΥΣΤΗΜΑΤΑ ΤΗΛΕΠΙΚΟΙΝΩΝΙΩΝ, ΕΤΑΙΡΕΙΑ ΑΞΙΟΠΟΙΗΣΕΩΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΕΩΣ ΤΗΣ ΠΕΡΙΟΥΣΙΑΣ ΤΟΥ ΠΑΝΕΠΙΣΤΗΜΙΟΥ ΑΘΗΝΩΝ, 2003. 3. Simon Haykin, Ψηφιακά Συστήματα Επικοινωνιών, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ, Έκδοση: 1η Έκδ./2014 - Recommended Article/Paper Resources: IEEE Transactions on Communications IEEE Transactions on Wireless Communications IEEE Survey and Tutorials on Communications IEEE Wireless Communications Letters IEEE Communications Letters

ELECTROMAGNETIC COMPATIBILITY

COURSE UNIT CODE	ETH1
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Kollatou T.
COURSE CONTENTS	Introduction to electromagnetic compatibility, basic definitions and concepts, electromagnetic interference, susceptibility and immunity, categorization of interference mechanisms, electromagnetic compatibility between systems. Standards, Public bodies, Instructions, CE certification. Interference in transmission lines and signal integrity, effect of discontinuities, per unit length parameters. Non-linear component behavior, radiation emission / susceptibility, antenna types for electromagnetic compatibility measurements. Conductive emissions / susceptibility, impedance filters and stabilizers, interference coupling mechanisms, effect of higher order harmonics. Cross-talking, inductive-capacitive coupling approximation model and protection types. Shielding systems, shielded cables, shielding performance, grounded systems, grounding types, circuit layout and protection devices. Electromagnetic compatibility measurement installations, open area test sites, anechoic chambers, reverberation chambers and TEM cells. Electromagnetic compatibility and effects on humans. Contribution of numerical techniques for electromagnetic compatibility problems.

LEARNING OUTCOMES / GENERAL COMPETENCES	1) Familiarity with the basic concepts and definitions of electromagnetic compatibility, linking to fundamental knowledge of electromagnetism. 2) Understand the mechanisms of development and suppression of interference, the non-linear operation of the main circuit components, and the mechanisms of cross talk. 3) In-depth understanding of shielding systems and grounding through realistic examples. 4) Understand the methodologies for measuring basic quantities and indicators of electromagnetic compatibility. 5) Learning measurement techniques and familiarity with the operation of the sound chamber. 6) Defining the concepts of electromagnetic compatibility through a series of selected works including the theoretical analysis of the electromagnetic phenomena involved, the design and construction of a prototype, the simulation and parametric analysis of its main features, and the evaluation of its functionality through series and comparisons.
PREREQUISITES	-
TEACHING METHODS	Lectures
ASSESSMENT METHODS	Exams (60%), assignments (40%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. P. Chatterton and M. Houlden, Ηλεκτρομαγνητική Συμβατότητα (EMC), Εκδόσεις Τζιόλα & Υιοι Α.Ε., Θεσσαλονίκη, 2000. 2. Χ. Καψάλης ανδ Π. Τρακάδας, Ηλεκτρομαγνητική Συμβατότητα (EMC), Εκδόσεις Τζιόλα & Υιοι Α.Ε., Θεσσαλονίκη, 2010. 3. C. R. Paul, Introduction to Electromagnetic Compatibility, 2nd edition, Wiley-Interscience, 2006. 4. D. Morgan, A Handbook for EMC Testing and Measurement, IET Electrical Measurement Series, 2007.

QUEUING THEORY

COURSE UNIT CODE	E9
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE176/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	An Introduction to Queues and Queueing Theory. Study and Evaluation Techniques for Queueing Systems, Telecommunication and Computational Model Systems. Little's Law. Basic Queueing Theory - I (Analysis of M/M/-/- Type Queues), Basic Queueing Theory - II (Departures, Method of Stages, Batch Arrivals), Birth-Death Processes. Analysis of the simple M/M/1 and M/G/1 Queue. M/M/1/N Queues and Multi-Server Systems : M/M/m, M/M/m/K, M/M/m/m (Erlang – B). Applications and Simulation to Packet Scheduling in High-Speed Networks and Modern Wireless Networks.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon completion of this course, on knowledge level, students will: • Gain knowledge and broad understanding of topics in the areas of queuing systems, stochastic processes, as well as simple and advanced queuing system models. • Be able to identify and describe problems that can be solved using queuing systems, as well as interpret and solve real-world problems using modelling approaches based on their knowledge of queuing systems. Upon completion of this course, on skills level, students will: • Be able to comprehend, explain, and infer in terms of the entities and variables of simple and complicated problems that originate from various scientific areas using queuing models such as M/M/1, M/M/m, M/M∞, M/M/1/m, M/M/m/m, M/M/1/K, M/G/1, and G/M/1. • Be able to autonomously solve simple and complicated stochastic-class problems and interpret the related elements that will enable the generalization of the conclusions during the problem-solving in order to publish and disseminate information, ideas, and conclusions to an inexpert audience. Upon the completion of this course, on competencies level, students will: • Be able to manage complicated techniques, effective methodologies, solution strategies, and professional activities by assuming responsibility for the decision-making by using queuing system modelling in unpredictable, heterogeneous, and competitive work environments by assuming responsibility for the management of professional development of persons and teams without risks and costly capital expenditures. To this end, the knowledge gained through this course will equip students with the skills and techniques to generate useful remarks and conclusions using simulations prior to real-world implementation. • Leverage their knowledge, comprehension, and problem-solving skills in various applications towards addressing problems in new and unknown environments, that are regulated by interdisciplinary and heterogeneous frameworks, towards exploiting the results that originate from applying queuing systems theory on research societal, and collaboration levels.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance-learning capability
ASSESSMENT METHODS	• Final written examination (70%), Greek • Laboratory exercises (30%)

LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. D. Fakinos, “Queuing Systems”, Simmetria, 2008 2. I. Tryfon, P. Daras, T. Sipsas, “Stochastic Developments”, Ziti, 2003 3. P. Chouchoulas, “Queuing Theory”, Simmetria, 2008 4. G. Kokolakis, I. Spiliotis, ”Probability Theory and Statistics with Applications”, Simeon, 2010 5. L. Kleinrock, “Queuing systems; Volume 1: Theory”, J. Wiley & Sons, New York, 1975. - Recommended Article/Paper Resources: 6. V. G. Kulkarni, “Modeling and Analysis of Stochastic Systems, Second Edition (Chapman & Hall/CRC Texts in Statistical Science)”, 2nd ed., Chapman and Hall/CRC, 2009. 7. T. Söderström, “Discrete-time Stochastic Systems”, 2nd ed., Springer, 2013. 8. M. Harchol-Balter, “Performance Modeling and Design of Computer Systems: Queueing Theory in Action”, 1st ed., Cambridge University Press, 2013. 9. W. J. Stewart, “Probability, Markov Chains, Queues, and Simulation: The Mathematical Basis of Performance Modeling”, Princeton University Press, 2009.

MOBILE AND SATELLITE COMMUNICATIONS

COURSE UNIT CODE	E48
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE328/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	• Introduction to mobile and satellite commutations. • Wireless propagation channel (pathloss, multipath fading). • Transmission and reception diversity, MIMO, CoMP. • Transmissions schemes (OFDM, SC-FDMA). • Relaying • Satellite channels • Multi-beam access in satellite systems
LEARNING OUTCOMES / GENERAL COMPETENCES	• The student understands the basic mechanisms of propagation in mobile and satellite communications and becomes familiar with the deterministic and contemplative models that describe them. • Familiarize yourself with the basic performance measures (expected value of signal to noise ratio (SNR) and signal to interference plus noise ratio (SINR), bit error rate (BER), symbol error rate (SER), outage probability and capacity) as well and with their theoretical calculation in intermittent channels. • Be familiar with modern interrupt control techniques and system performance enhancement techniques (such as adaptive modulation coding, multiple-input multiple-output transmission techniques, and transponders). • Familiarize yourself with the main components of satellite
PREREQUISITES	-

TEACHING METHODS	• Face to Face • Teleconference tools, Moodle website • Videos • GNURadio/Matlab/Octave
ASSESSMENT METHODS	Final exams
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. T. Rapaport, “Ασύρματες επικοινωνίες,” εκδόσεις Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ ΕΕ 2. W. Stalling, B. Cory, “ΑΣΥΡΜΑΤΕΣ ΕΠΙΚΟΙΝΩΝΙΕΣ ΚΑΙ ΔΙΚΤΥΑ”, εκδόσεις Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε. 3. M. Genard, M. Bousquet, “Δορυφορικές Επικοινωνίες,” εκδόσεις Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε. - Recommended Article/Paper Resources: IEEE Transactions on Communications IEEE Transactions on Wireless Communications IEEE Survey and Tutorials on Communications IEEE Wireless Communications Letters IEEE Communications Letters

Information and Coding Theory

COURSE UNIT CODE	EYH2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY113
TEACHING WEEKLY HOURS	4
INSTRUCTOR	K. Hatzisavvas

COURSE CONTENTS

- Coding; basic principles and applications
- Prefix free codes
- Source coding. Optimal codes. Huffman coding.
- Information and entropy.
- Communication channel-capacity of communication channel. Shannon's first theorem.
- Information transmission. Mutual information.
- Data compression. Data compression algorithms.
- Numerical coding. Lexicographic coding.
- Noisy communication channel. Hamming distance. Error detection-error correction codes.
- Noisy channel coding theorem. Shannon's second theorem.
- Linear codes (Hamming, Bauer, Golay, MDS)
- Non-linear codes (Reed-Muller)
- Cyclic codes.
- Cryptography; basic principles and applications
- Popular encryption schemes
- Public key cryptography
- RSA encryption
- Quantum cryptography

LEARNING OUTCOMES / GENERAL COMPETENCES

The aim of the course is to introduce information theory. which is the basis for the scientific field of electrical engineering with a wide range of applications, such as coding and cryptography.

After the successful completion of the course the learning outcomes are, in summary, the following:

A. Knowledge

• Have proven knowledge and understanding of key concepts and topics such as information, information entropy, communication systems and Shannon theorems. Also, comprehend basic coding methodologies, data compression and error correction codes. Finally, basic concepts and forms of cryptography, public key cryptography and RSA encryption.

• Able to understand basic concepts in cutting-edge applications of information theory, such as quantum cryptography

• Able to identify and describe simple and complex coding and encryption problems solved using information theory.

• Understand basic mathematical tools of information-coding theory, such as probability distributions-entropy, elements of number theory, elements of groups, finite fields, and vector spaces.

B. Skills and capabilities

• Able to understand and explain key entities such as information, information entropy, capacity of a communication channel, size and rate of transmission of a code, number of errors that can be detected and/or corrected.

• Able to interpret relevant elements that will allow them to generalize their conclusions when solving problems and to publish their results to a non-specialist audience.

• They can manage simple and complex techniques-methodologies related to problem solving using information theory. These techniques include probability theory, advanced algebra, and number theory. They are able to simulate and solve simple and complex problems of information theory, coding and encryption, using software packages (with emphasis on open-source software packages, e.g., R and Python).

• Able to use the knowledge gained in the course to negotiate issues and problems in new, unfamiliar environments characterized by interdisciplinarity, as well as to recognize solutions and applications in various fields.

PREREQUISITES	-
TEACHING METHODS	Face-to-face (Distant learning is supported, if necessary)
ASSESSMENT METHODS	• Four sets of exercises during the semester • Written examination at the end of the semester (multiple choice questions, short development questions, problem solving questions)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek (English)
RECOMMENDED BIBLIOGRAPHY	1. Εισαγωγή στη θεωρία Πληροφοριών, Κωδίκων και Κρυπτογραφίας, 2015, Ν. Αλεξανδρής, Β. Χρυσικόπουλος, (ISBN: 978-960-7996-39-8) 2. Θεωρία της Πληροφορίας, 2011, David Luenberger (ISBN: 978-960-491-020-5) 3. Μια εισαγωγή στην Αλγεβρική Θεωρία Κωδίκων, 2016, Δ. Βάρσος, (ISBN: 978-960-603-040-6)

NETWORK PROGRAMMING

COURSE UNIT CODE	ETH3
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY105/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Michalas A.
COURSE CONTENTS	The course outline covers the following topics: • Basic development tools on the World Wide Web • The asynchronous client-server model • Application architectures (client-server, n-tier), middleware architectures • Markup languages (HMLT, CSS) and programming languages (Javascript / PHP / Java) for the development of web applications • Database connectivity using XML, DTD and DOM APIs • Asynchronous server-client communication via AJAX and JSON and web services • Packages for the development of integrated Internet applications (Java / Spring Boot, PHP / Laravel, Java / Heroku, PHP / Symfony), • Versioning Control Systems - use of git.

LEARNING OUTCOMES / GENERAL COMPETENCES	On successful completion of this module the student will be able to: • Have good knowledge of Internet protocols (HTTP (S) / TCP / IP) • Be familiar with the three-tier application development model and how it applies to web-based applications. • Understand how Internet applications are being executed. • Know how to implement web servers, their structural elements and their functionality. • Build dynamic web applications utilizing existing technologies and languages. • Use application programming interfaces (APIs) to communicate network system applications. • Be able to continuously educate himself on the latest internet technologies
PREREQUISITES	-
TEACHING METHODS	• Theoretical treatment in class, aided by active discussion and participation of students. • Teaching material is presented by Power-Point presentations. • Laboratory exercises are provided for understanding the course material. • Provisioning of Online learning resources
ASSESSMENT METHODS	Final examination weighted at 50%, examination of laboratory exercises weighted at 20% and examination of the course assignment weighted at 30%. 1. The final exam includes: - Multiple choice questions. - Problem solving by applying the acquired knowledge. - Comparative evaluation of theoretical issues. 2. The examination of the laboratory exercises includes the evaluation of the laboratory skills acquired using laboratory equipment and software platforms. 3. The examination of the course assignment includes the evaluation of a web application implemented by the student.
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. "Τεχνολογίες κ Προγραμματισμός στον Παγκόσμιο Ιστό" Δουληγέρης, Μαυροπόδη, Κοπανάκη, Καραλής Εκδόσεις Νέων Τεχνολογιών, Μάιος 2017. 2. "Fundamentals of Web Development ". Randy Connolly, Ricardo Hoar, 3d edition-Pearson. 3. " Internet & World Wide Web How to Program, ", Deitel Paul J., Deitel Harvey, 4th Edition-Pearson. 4. " PHP and MySQL Web Development, ", Thomson Laura, Welling Luke, 5th Edition-Addison-Wesley Professional. 5. " Teach Yourself PHP, MySQL and Apache All in One ", Julie C. Meloni, 5th edition – Sams. 6. " Teach Yourself Ajax, Javascript, and Php All in One ", Ballard Phil, Moncur Micheael, original edition – Sams. 7. "Java How to Program: Early Objects Version, 8th Edition ", Deitel Paul J., Deitel Harvey M., 8th edition-Pearson.

BASIC PRINCIPLES OF THE INTERNET OF THINGS

COURSE UNIT CODE	ETH10
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY120/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Sarigiannidis P.
COURSE CONTENTS	Basic Principles of Wireless Sensor Networks, Architectures, Protocols, Operating Systems and Wireless Sensor Network Programming, Devices, Communications and Data Processing in Internet of Things, Schemes and Protocols: CoAP, MQTT, AMQP, 6LoWPAN, Industrial Protocols and Applications, Internet of Things Infrastructures and Synergies with Cloud Infrastructures, Data and Infrastructure Security in Internet of Things, Protection of Privacy in Internet of Things, Telemetry Applications, Quality of Service, Energy Considerations

LEARNING OUTCOMES / GENERAL COMPETENCES	• Upon completion of this course, on knowledge level, students will: • Gain knowledge and broad understanding of topics in the areas of Internet of Things and Wireless Sensor Networks. • Be able to identify and develop solutions for real-world problems by leveraging Internet of Things applications. • Upon completion of this course, on skills level, students will: • Be able to comprehend architectures, standards, components, applications, and tools of the Internet of Things. Furthermore, they will be able to understand and interpret the role of Internet of Things in information and communication technologies, and gain skills relevant to the integration of data and infrastructure security mechanisms. • Be able to autonomously solve simple and complicated problems of designing and implementing intelligent applications and environments in the Internet of Things, as well as interpret the related elements that will enable the generalization of the conclusions during the problem-solving in order to publish and disseminate information, ideas, and conclusions to an inexpert audience. • Upon the completion of this course, on competencies level, students will: • Be able to manage complicated techniques, effective methodologies, solution strategies, and professional activities by assuming responsibility for the decision-making through the inference of Internet of Things data. • Leverage their knowledge, comprehension, and problem-solving skills in various applications towards addressing problems in new and unknown environments, that are regulated by interdisciplinary and heterogeneous frameworks, towards exploiting the results that originate from solving problems in Internet of Things environments, on research, societal, and collaboration levels.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance-learning capability
ASSESSMENT METHODS	• Final written examination (90%), English • Laboratory exercises (10%) • Oral examination (±20%)

LANGUAGE OF INSTRUCTION/EXAMS	English
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. O. Hersent, D. Boswarthick, & O. Elloumi, 'The internet of things: Key applications and protocols. J. Wiley & Sons, 2011 2. F. Behmann, & K. Wu, 'Collaborative internet of things (C-IoT): For future smart connected life and business', Wiley,2015 Sons, New York, 1975 - Recommended Article/Paper Resources: 3. A. Triantafyllou, P. Sarigiannidis, T. D. Lagkas. "Network protocols, schemes, and mechanisms for internet of things (iot): Features, open challenges, and trends." Wireless communications and mobile computing 2018 4. P. Radoglou-Grammatikis, P. Sarigiannidis, I. D. Moscholios. "Securing the Internet of Things: Challenges, threats and solutions." Internet of Things 5 (2019): 41-70

8TH SEMESTER – DIVISION OF TELECOMMUNICATIONS & NETWORKS

MOBILE COMMUNICATION NETWORKS

COURSE UNIT CODE	Y5
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE202/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Louta M.
COURSE CONTENTS	Basic principles. Propagation and Interference. Cellular Systems Architecture. 2G, 2.5G, 3G, 4G Mobile Communication Systems. Basic functionalities and operations. Mobile Communication Systems Design. Resource Allocation. Radio-channel management. Mobility Management. Handover techniques. Signaling Systems.
LEARNING OUTCOMES / GENERAL COMPETENCES	The course objective is the comprehension and learning of the various mobile communication networking technologies. In this context, a wide range of issues are addressed, aiming to cover mobile communication networks and techniques for network design, development, management and evaluation.
PREREQUISITES	-
TEACHING METHODS	The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. Exercises are solved.
ASSESSMENT METHODS	Course assessment is conducted by written exams taking place at the middle and the end of the semester, including questions (both open and multiple choice) as well as exercises that cover the course content (30% and 70%, respectively).
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Λούβρος Σπυρίδων, *Το Δίκτυο LTE*, Εκδοσεις Νεων Τεχνολογιων, Έκδοση: 1η/2014. 2. Stallings W. - Beard C., *Ασύρματες Επικοινωνίες, Δίκτυα και Συστήματα*, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ, Έκδοση: 1η/2016. 3. Μ. Θεολόγου, *Δίκτυα Κινητών και Προσωπικών Επικοινωνιών*, 2η Έκδοση, 2010, Εκδόσεις Τζιόλα. 4. W. Stallings, *Ασύρματες Επικοινωνίες και Δίκτυα*, 1η Έκδοση, 2007. Εκδόσεις Τζιόλα.

OPTICAL COMMUNICATIONS AND NETWORKS

COURSE UNIT CODE	Y6
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE199/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	Waveguiding in Optical Fibers, Optical Fibers, Attenuation, Dispersion, Non-Linear Effects, Generation and Reception of Optical Signals, Optical Transmitter and Receiver, Optical Amplifiers, WDM Optical Networks, Optical Switching and Routing in Access and Core Networks, Optical Burst Switching, Contemporary Optical Networks, Broadband Optical Networks, Passive Optical Networks, Hybrid Optical Wireless Optical Networks.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon completion of this course, on knowledge level, students will: • Gain knowledge and broad understanding of topics in the areas of optical communication systems and technologies, as well as the characteristics of optical transmission and optical fibers. • Be able to identify and solve real-world problems by using optical communication systems and technologies. Upon completion of this course, on skills level, students will: • Be able to comprehend, explain, and analyze various optical transmission phenomena, such as attenuation and dispersion, as well as the operatic principles of optical devices (transmitter, receiver, amplifier), burst optical switching, and passive optical networking. • Be able to autonomously solve simple and complicated problems in terms of designing and implementing optical communication systems. Additionally, students will be able to interpret the related elements that will enable the generalization of the conclusions during the problem-solving in order to publish and disseminate information, ideas, and conclusions to an inexpert audience. Upon the completion of this course, on competencies level, students will: • Be able to manage complicated techniques, effective methodologies, solution strategies, and professional activities by assuming responsibility for the decision-making related to the design and implementation of modern solutions by exploiting optical communication systems and technologies. • Leverage their knowledge, comprehension, and problem-solving skills in various applications towards addressing problems in new and unknown environments, that are regulated by interdisciplinary and heterogeneous frameworks, towards exploiting the results that originate from solving problems through the use of optical communication technologies on research, societal, and collaboration levels.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance-learning capability
ASSESSMENT METHODS	• Final written examination (60%), Greek • Laboratory exercises (30%) • Presentation of semester assignment (10%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. G. Paul, “Fiber Optic Networks”, Papsotiriou, 1994 2. G. I. Papadimitriou, et al., "WDM Optical Networks: Local and Metropolitan Networks", Kleidarithmos 3. G. Agrawal, "Fiber-Optic Communication Systems", Tziola, 2011 4. N. Ouzounoglou, "Fiber-Optic Telecommunications", Simeon, 1999 5. B. Mukherjee, "Optical WDM Networks", Springer, 2006 - Recommended Article/Paper Resources: 6. R. Ramaswami, K. Sivarajan, G. Sasaki, “Optical Networks: A Practical Perspective”, 3rd ed., Morgan Kaufmann, 2009 7. D. Hood, “Gigabit-capable Passive Optical Networks”, Wiley, 2012 8. B. Mukherjee, “Optical WDM Networks”, Springer, 2006 9. N. Antoniades, G. Ellinas, I. Roudas, “WDM Systems and Networks: Modeling, Simulation, Design and Engineering (Optical Networks)”, Springer, 2012.

COMPUTER AND NETWORK SECURITY

COURSE UNIT CODE	Y11
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE198/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Sarigiannidis P.
COURSE CONTENTS	Security background, Threat analysis, Vulnerability points, Techniques on Cryptography, Symmetrical and unsymmetrical cryptography, Authentication, Digital signatures, Security providing protocols, IPSec, SSL, SSH, PGP, MIME, SET. Ports, TCP/IP security, Port scanning, Network security, Information system security, Databases security, Firewalls, Sniffing tools, Defense tools, Intruder Detection Systems (IDSs), OpenSSL, Certificates, Signatures, Security framework institution, Security standards, Security politics, Legal issues.

LEARNING OUTCOMES / GENERAL COMPETENCES

Upon completion of this course, on knowledge level, students will:

- Gain knowledge and broad understanding of topics in the areas of computer and network security and protection of privacy.
- Be able to identify and describe the challenges of security and protection of data, systems, communication networks, databases, and infrastructures. Interpret and solve issues regarding secrecy, digital signature, and information integrity by using the knowledge and tools gained in this course. Moreover, students will be able to identify the needs and requirements in terms of selecting and applying cryptographic schemes in simple and complicated problems by leveraging the knowledge of cryptography, number theory, as well as the extension of cryptography to communication networks.

Upon completion of this course, on skills level, students will:

- Be able to comprehend, explain, and infer in terms of the needs, the requirements, and the complexity of public and private key cryptographic schemes. Also, students will be able to identify the principles, concepts, and applications of authentication mechanisms. digital signatures, and cryptographic hash functions such as Hash and MAC.
- Be able to autonomously solve simple and complicated problems of security systems and communication networks using various monitoring and firewall software, intrusion detection systems, and proxy services. Additionally, students will be able to interpret the related elements that will enable the generalization of the conclusions during the problem-solving in order to publish and disseminate information, ideas, and conclusions to an inexpert audience.

Upon the completion of this course, on competencies level, students will:

- Be able to manage complicated techniques, effective methodologies, solution strategies, and professional activities by assuming responsibility for the decision-making in both small and large projects related to providing security and privacy services in public and private organizations. Furthermore, students will be equipped with the appropriate skills for assessing and estimating the required actions for the design and development in unpredictable, heterogeneous, and competitive work environments by assuming responsibility for the management of professional development of persons and teams that takes into account relevant regulations, such as the GDPR for the protection of private data.
- Leverage their knowledge, comprehension, and problem-solving skills in various applications towards addressing problems in new and unknown environments, that are regulated by interdisciplinary and heterogeneous frameworks, towards

PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance-learning capability
ASSESSMENT METHODS	• Final written examination (60%), Greek • Laboratory exercises (30%) • Presentation of semester assignment (10%) • Oral examination (±20%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. S. Gritzalis, D. Gritzalis, S. Katsikas, "Computer Network Security", Papasotiriou, 2003 2. W. Stallings, "Computer Security: Principles and Practice", Kleidarithmos, 2008 3. W. Stallings, "Cryptography and Network Security Principles and Practices,", Kleidarithmos, - Recommended Article/Paper Resources: 4. W. Stallings, "Network Security Essentials Applications and Standards", 5th ed., Prentice Hall, 2013. 5. E. Cole, "Network Security Bible", Wiley, 2009. 6. S. McClure, J. Scambray, G. Kurtz, "Hacking Exposed 7: Network Security Secrets & Solutions, Seventh Edition", 7th ed., McGraw-Hill Osborne Media, 2012. 7. W. Stallings, "Cryptography and Network Security: Principles and Practice", 6th ed., Prentice Hall, 2013. 8. M. Rhodes-Ousley, R. Bragg, K. Strassberg, "Network Security: The Complete Reference", 1st ed., McGraw-Hill Osborne Media, 2003.

WIRELESS SENSOR NETWORKS

COURSE UNIT CODE	E14
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://wsnlab.icte.uowm.gr/ http://eclass.uowm.gr/courses/ICTE165/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Aggelidis P.

COURSE CONTENTS	The course covers leading edge topics in Wireless Sensor Networks. The use of distributed wireless sensor networks has surged in popularity in recent years with applications ranging from environmental monitoring and body area networks to people- and object-tracking in both cooperative and hostile environments. The goal of this course in to give an overview of fundamental problems in the area of Wireless Sensor Networks and study the existing solutions for some of these problems. The course is targeted at understanding and obtaining hands-on experience with the state of the art in such wireless sensor networks which are often composed using relatively inexpensive sensor nodes that have low power consumption, low processing power and bandwidth. The course covers a variety of topics ranging from radio communications, network stack (with emphasis in 802.11.x Blue-tooth and 802.15.4/Zigbee), systems infrastructure including QoS support and energy management, programming paradigms, distributed algorithms and example applications. Data aggregation, information dissemination, security issues, power management, localization are topics also covered in this course. The course students will be assigned projects that will involve implementation on Micaz (TinyOS) and Arduino motes. Introduction to wireless sensor networks. Examples of Applications. Node Structure, Network Organization. Self-organizing and routing approaches. Main planning issues. Arduino microcontroller programming. TinyOS Operating System. Overview of operating systems and intermediate software. Applications of environmental telemetry and wireless networks of health sensors. Optimization of Energy Consumption. M2M communication and use of the MQTT protocol. Cloud services for LoRaWAN applications and use of TheThingsNetwork console. Use Node-Red, a visual environment for IoT scenarios.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon completion students will be able to: • Understand concepts such as wireless sensor network, sensor nodes, gateways, routing, security • Use the material part of the laboratory • Develop experimental sensor networks based on multilevel protocols • Create relevant algorithmic software • Implement electronic circuits • Design applications of precision agriculture, monitoring of quality of life and health parameters and environmental interventions • Solve problems within the lab and consider scenarios • Program sensor nodes • Understand the roles of participants in WSNs
PREREQUISITES	-
TEACHING METHODS	Lectures Labs Remote
ASSESSMENT METHODS	30% test (multiple choice, short answer questions) 70% project
LANGUAGE OF INSTRUCTION/EXAMS	Greek-English
RECOMMENDED BIBLIOGRAPHY	1. Gardner Julian W., *Μικροαισθητήρες*, Εκδ. Α. Τζιολα & Υιοι 2. Τεχνολογία Μετρήσεων - Αισθητήρια, Γαστεράτος, Μουρούτσος, Ανδρεάδης

BIOMEDICAL TECHNOLOGY

COURSE UNIT CODE	E15
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE149/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Aggelidis P.

COURSE CONTENTS	Biomedical Technology and the Biomedical Engineer, present and future. Cellular Engineering-Bioelectronics: The cell, biological macromolecules. Membranes, Membrane structure. Electrical membrane potentials. Dynamically in a state of imbalance. Diffusion, Nerst - Plank Equations. Mosaic membrane. Neurons, neuron anatomy, Dynamics (Gradual and Active). Digital Biological Signal Processing: signal processing methods and techniques derived from biological systems, signals and systems, design and implementation of digital filters, applications. Cardiac Physiology and Electrocardiogram (ECG): the myocardium, rhythmic stimulation of the heart, the normal cardiogram, cardiac arrhythmias and their electrocardiographic interpretation, the electronic equipment required to record the heart signal. Blood Pressure Measurement: arterial, pulmonary and venous blood pressure, systolic and diastolic blood pressure, blood pressure waveforms, propagation and reflection, pressure measurement methods, direct way, indirect way. Brain Physiology and Electroencephalogram (EEG): Elements of cerebral neurophysiology, electroencephalogram function, EEG features and electroencephalographic research, experiential brain potential, EEG processing and extraction of information on intracranial function. Electromyography: skeletal muscle structure, nerve impulse, electromyography (EMG), electrically stimulated EMG, EMG applications Introduction to Medical Imaging Systems. Methods of Medical Image Reconstruction. Computed Tomography. Nuclear Medicine and SPECT Tomography: Nuclear Magnetic Resonance Ultrasound Imaging Methods.
LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of the course is the introduction to the evolving research field of biomedical technology, in which the application of the principles of science and technology is to provide services and solutions to problems and address challenges in the critical social field of Health. Due to the interdisciplinary nature of the course, students come into contact with different scientific fields, such as the production of biomarkers, their analysis and the use of appropriate instruments for their study and analysis.
PREREQUISITES	-
TEACHING METHODS	Lectures Labs Remote

ASSESSMENT METHODS	40% final exam 40% lab test. 20% homework.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. P. ANGELIDIS, Medical Informatics volume A, "wisdom", 2011. 2. Koutsouris Dionysis - Dimitris, Nikita Konstantina S., Pavlopoulos Sotiris A., Medical imaging systems, A. TZIOLA & SONS PUBLICATIONS, 2005. 3. Sergiadis George D., Biomedical technology, University Studio Press, 2009. 4. Koutsouris Dionysis - Dimitris, Pavlopoulos Sotiris A., Prentza Andriana A., Introduction to biomedical technology and analysis of medical labels, A. TZIOLA & SONS PUBLICATIONS, 2003.

OPTICS

COURSE UNIT CODE	E49
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE392/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	

COURSE CONTENTS	• Geometrical optics – Approximation of geometrical optics, geometrical optics laws, ray tracing, Huygens principle, Fermat principle and optical length • Gaussian optics - Ray tracing, optical system and transition matrix, mirror formation, basics of optical system, lenses, applications. • Apertures – Entrance apertures and optical system irises, field apertures and optical system windows, optical field, focal and field depth. • Aberration elements – Aberration types, aberration of wavefront ray aberration, monochromatic aberrations: spherical, coma, astigmatism, curvature of the field of the image, distortion, chromatic aberration • Light interference – Interference of two waves, conditions of existence and coherence, fringes, interference of point sources, young experiment and fundamental interference structures • Interferometry – Operation principle of interferometers, Michelson interferometer, Mach-Zehnder and Fabry-Perot interferometers, resolution and free spectral range • Scalar theory of diffraction- The propagation of a light disturbance in space. Green's function. Kirchhoff's boundary conditions. Fresnel and Fraunhofer diffraction. • Fourier optics - The propagation of a light disturbance in the spatial frequency domain. Angular spectrum. The propagation as a frequency filter. Transmittance function. Elementary optical processes. • Principles of optical processing -Elementary physical phenomena: propagation, reflection, refraction, thin lens. Propagation through lens. Image formation. Optical system operating with coherent and incoherent light. • Holography – Hologram construction, reconstruction, hologram types and applications

LEARNING OUTCOMES / GENERAL COMPETENCES	The course includes an introduction to the concepts of classical optics and its applications. The context of the course targets to the introduction of the basic parameters of optics and the knowledge of characteristic properties along with an association with the other domains of electrical engineering. Moreover, the course offers an update on the applications of optics and optic devices along with their functionality and the relevant applications. Finally, this course offers to the students the opportunity to get prepared for the forthcoming courses of photonic technology and optical communications. Additionally, it offers the capability of development of a rational analytical and structural way of thinking. Upon the successful completion of this course, students will be able to: Understand the basic concepts of transmission of optical waves, Recognize optical structures and analyze their functionality, Familiarize with design methodologies for complex structures, Aware of a broad spectrum of practical classical and modern applications of optics.
PREREQUISITES	KNOWLEDGE OF THE COURSE: “ELECTROMAGNETIC WAVES”
TEACHING METHODS	• Face to face • Possibility of remote education

ASSESSMENT METHODS	The final degree is calculated from a final written examination. There is a need of a degree of 5 out of 10, or greater for considering the examination as successful. Moreover, the possibility of optional semester exercises that can offer an additive degree, in the case that the degree of the written examination exceeds 5, can be given. Students' evaluation means: • Written examination through short-answer questions (Formative, conclusive) • Written examination through open-ended questions (Formative, conclusive) • Written work (Formative, conclusive) • Written examination via problem solving (Formative, conclusive) The utilization of multiple literature sources is realized whereas the students are being monitored while executing the optional exercises. The final evaluation is being announced through the electronic course platform, where all the students that have are officially listed to the course have access. Moreover, after the evaluation announcement, timeslots for discussion regarding the examination are set, so that the students see their exam answers and any possible mistakes. The outline of the course, the course targets and the valuation criteria are announced both orally during the lectures and through the course website (e-class).
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Hecht Eugene, Οπτική, Γ. ΔΑΡΔΑΝΟΣ - Κ. ΔΑΡΔΑΝΟΣ Ο.Ε., 1η Έκδοση/2018 (επιστ. επιμ. Βές Σωτήρης). 2. Γιώργος Ασημέλλης, Γιάννης Βαμβακάς, Πάνος Δρακόπουλος, Γεωμετρική Οπτική, ʻΕκδοση 1η/2012. 3. Introduction to Optics: International Edition, 3ed. - Pedrotti, Frank L.; Pedrotti, Leno M.; Pedrotti, Leno S. - Addison-Wesley [Pearson], 2007, USA. 4. Fundamentals of Optics, 4ed - Jenkins, Francis A; White, Harvey E. - McGraw-Hill, 2001, USA. - Recommended Article/Paper Resources: Journal of Optical Technology – OSA Applied Optics – OSA Journal of Optics – IOPscience Optics – MDPI IEEE Photonics Journal IEEE Photonics Technology Letters

TELETRAFFIC THEORY

COURSE UNIT CODE	E37
COURSE UNIT TYPE	Specific background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE301/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	Introduction to communication systems' analysis as the tool to assess the performance and define the dimension of a communication network. Analytical methods for the determination of critical network performance metrics (blocking probability, capacity utilization, etc.) that define the quality of the communication in a communication network. These methods include the Markovian and Birth-Death processes, the Erlang and Engset models, the Kaufman-Roberts recursion, the equivalent random theory, the alternative routing modeling, and the reduced load approximation. Simulation techniques for assessing the performance of

LEARNING OUTCOMES / GENERAL COMPETENCES	Comprehension of the following main theory parts: • Analysis of communication networks • Methodology for assessing the performance and defining the dimensions of communication networks • Application of statistical methods, probability theory, and stochastic processes on communication network performance problems • Analytical methods for the determination of communication-networks' performance metrics • Knowledge on the derivation of analytical methodologies for the assessment of the performance of communication networks • Knowledge on simulation methods for the analysis of communication networks Competences: • Search for, analysis and synthesis of data and information by the use of appropriate technologies • Decision-making • Individual/Independent work
PREREQUISITES	-
TEACHING METHODS	Live lectures
ASSESSMENT METHODS	Assignments (30%) Final exams (70%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Michael Logothetis, Teletraffic Theory, 3rd edition. 2. Related papers from journals/conference proceedings

CLOUD COMPUTING

COURSE UNIT CODE	E39
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE297/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	Michalas A.
COURSE CONTENTS	The course outline covers the following topics: • Distributed systems management, • Performance measurement in shared distributed systems and Cloud Computing, Service-oriented implementations of applications and infrastructures, • Quality of service on distributed systems and cloud computing, workflow and monitoring of distributed applications, • Forecasting techniques, execution study and modeling of service-oriented applications and distributed infrastructures, • Assigning resources to applications on distributed systems, • Use, data management and comparison / selection of multiple clouds, • Intermediate systems.

LEARNING OUTCOMES / GENERAL COMPETENCES	The course aims to understand the basic concepts and principles that govern Cloud Computing, so as to enable the solution of technological problems as well as the performance analysis, management, optimization and design of modern distributed systems. Upon completion of the course the student acquires knowledge and understanding of the following topics: • distributed systems management • cloud computing technologies and models • cloud computing features • performance measurement on shared distributed systems and cloud computing • service-oriented implementations of applications and infrastructures • workflow and monitoring in distributed applications • cloud computing system load forecasting techniques • intermediate systems
PREREQUISITES	-
TEACHING METHODS	• Theoretical treatment in class, aided by active discussion and participation of students. • Teaching material is presented by Power-Point presentations. • Laboratory exercises are provided for understanding the course material. • Provisioning of Online learning resources
ASSESSMENT METHODS	Final examination weighted at 50%, examination of laboratory exercises weighted at 20% and examination of the course assignment weighted at 30%. 1. The final exam includes: - Multiple choice questions. - Problem solving by applying the acquired knowledge. - Comparative evaluation of theoretical issues. 2. The examination of the laboratory exercises includes the evaluation of the laboratory skills acquired using laboratory equipment and software platforms. 3. The examination of the course assignment includes the evaluation of a cloud-based application implemented by the student.
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Cloud Computing Concepts, Technology & Architecture. Zaigham Mahmood, Ricardo Puttini, Thomas Erl, 1st Edition - Pearson 2013. 2. Cloud Computing, A Practical Approach, A. T. Velte, T. J. Velte, R. Elsenpeter, McGraw-Hill-2010. - Recommended Article/Paper Resources: Cloud computing – Theory and practice, Dan C. Marinescu, 2nd Edition – Elsevier-2017.

PHOTONICS – OPTICAL DEVICES

COURSE UNIT CODE	E46
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE320/
TEACHING WEEKLY HOURS	4
INSTRUCTOR	
COURSE CONTENTS	Basics of waveguiding, optical fibers and integrated (planar) waveguide structures. Attenuation, dispersion and nonlinear mechanisms in optical communications. Mode-coupling structures (directional couplers, tapers, periodic Bragg gratings, counter-propagating). Passive and tunable components (mirrors, tapers, Y-junctions, isolators & circulators, modulators, resonators, filters, routers, switches, multiplexes, arrayed-waveguide gratings). Active optical devices: sources (laser diodes and LEDs), receivers (detectors, photodiodes, noise), amplifiers (erbium-doped fibers, semiconductor). Synthesis of integrated photonic circuits. Areas with active research interest. Extra contents: • Educational laboratory kit of a full optical communication system (laser source, modulator, optical fiber, receiver/demodulator photodiode), to be demonstrated to students. • Introduction to scientific programming and use of specialized software for analysis and design of photonic and optical devices.

LEARNING OUTCOMES / GENERAL COMPETENCES	This course is an introduction to photonics while also covering fundamental optical principles. After successful completion of the course, the students will… • Comprehend the principles of waveguiding in optical structures • Break-down complex photonic/optical structures into the constituting components • Design and implement simple photonic components for telecom/datacom applications • Familiarize with methodologies for the design of advanced devices • Acquaintance with technologies for the fabrication of photonic/optical devices and associated challenges. • Identify photonic components and understand their role in optical communication systems. • Be able to explain to non-experts the relation of these technologies with society, economy, and human welfare, and identify opportunities and threats.
PREREQUISITES	None. However, knowledge from course "Electromagnetic waves" (5th semester) is essential.
TEACHING METHODS	Face-to-face (theory and exercises) Remote teaching when needed
ASSESSMENT METHODS	• Final score from written exams: Basic understanding and judgement (theory), solution of simple exercises/problems (analysis or design). Students can pick from a set of questions due to the large corpus. • Homework projects to improve final grade, only if combined score of exams & lab is greater than 5. Projects are only undertaken during the teaching semester (spring).
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Οπτοηλεκτρονική, Αλεξανδρής Α. 2. Εφαρμοσμένη Οπτική, 3η Έκδοση, Ζευγώλης Δ. 3. ΟΠΤΙΚΗ ΚΑΙ ΛΕΙΖΕΡ, M. Young 4. Οπτοηλεκτρονική, Νέα Βελτιωμένη, Singh Jasprit 5. Συστήματα Επικοινωνιών με Οπτικές Ίνες, Agrawal G. P. - Recommended Article/Paper Resources: Online content (URL) provided from course website.

Big Data and Cognitive Internet of Things Applications

COURSE UNIT CODE	ETH11
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY124/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Sarigiannidis P.
COURSE CONTENTS	Advanced topics in Internet of Things: Distributed and Mobile Computing Systems, Architectures and Design Considerations in Cloud Computing, Big Data and Internet of Things: Collection, Processing, Storage, Interoperability, and Data Analysis, Machine Learning Applications and Data Management in the Internet of Things, Advanced Security and Privacy Considerations, Security Certificates in Internet of Things, Modern Standards and Protocols: Trends, Synergies with Wired and 5G Networks, Case Studies in Cognitive Applications: Smart Agriculture, Smart City, Smart Grid, Smart Home, and Smart Healthcare services.

LEARNING OUTCOMES / GENERAL COMPETENCES	• Upon completion of this course, on knowledge level, students will: • Gain knowledge and broad understanding of topics in the areas of Big Data and cognitive applications, as well as their integration in the Internet of Things. • Be able to identify and develop solutions for real-world problems by using Machine Learning-based cognitive applications that leverage Big Data. • Upon completion of this course, on skills level, students will: • Be able to comprehend architectures and distributed computing systems in Internet of Things environments. Furthermore, students will gain the required skills for designing and implementing Big Data scenarios in Internet of Things environments and integrate security mechanisms for data and infrastructure. • Be able to autonomously solve simple and complicated problems of designing and implementing cognitive Big Data applications by using modelling and energy evaluation techniques. Moreover, students will be able to interpret the related elements that will enable the generalization of the conclusions during the problem-solving in order to publish and disseminate information, ideas, and conclusions to an inexpert audience. • Upon the completion of this course, on competencies level, students will: • Be able to manage complicated techniques, effective methodologies, solution strategies, and professional activities by assuming responsibility for the decision-making through the leverage of Big Data and cognitive applications. • Leverage their knowledge, comprehension, and problem-solving skills in various applications towards addressing problems in new and unknown environments, that are regulated by interdisciplinary and heterogeneous frameworks, towards exploiting the results that originate from solving problems in Big Data environments, on research, societal, and collaboration levels.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Distance-learning capability

ASSESSMENT METHODS	• Final written examination (90%), English • Laboratory exercises (10%) • Oral examination (±20%)
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. O. Hersent, D. Boswarthick, & O. Elloumi, ‘The internet of things: Key applications and protocols. J. Wiley & Sons, 2011 2. F. Behmann, & K. Wu, ‘Collaborative internet of things (C-IoT): For future smart connected life and business’, Wiley,2015 Sons, New York, 1975 - Recommended Article/Paper Resources: 3. A. Triantafyllou, P. Sarigiannidis, T. D. Lagkas. "Network protocols, schemes, and mechanisms for internet of things (iot): Features, open challenges, and trends." Wireless communications and mobile computing 2018 4. P. Radoglou-Grammatikis, P. Sarigiannidis, I. D. Moscholios. "Securing the Internet of Things: Challenges, threats and solutions." Internet of Things 5 (2019): 41-70

9TH SEMESTER – DIVISION OF TELECOMMUNICATIONS & NETWORKS

MICROWAVE COMMUNICATIONS

COURSE UNIT CODE	Y8
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY140/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	S. Amanatiadis

COURSE CONTENTS	Fundamentals on transmission lines • Electromagnetic analysis – Electromagnetic equations and their solutions for transmission lines. • Circuit analysis – Circuit models of transmission lines and their analysis. • Transmission line characteristics – Basic transmission line properties, as propagation constant, characteristic impedance, phase velocity and group velocity. • Propagating modes – Characterization of propagating modes in transmission lines (TEM, quasi TEM, TE, TM, hybrid). • Transmission line examples – Co-axial cable, waveguides, planar transmission lines. Transmission line analysis • Properties of transmission lines – Input impedance, reflection coefficient and SWR. • Impedance matching – The concept of matching in microwave transmission lines and matching elements like splitters. • Smith chart– Fundamentals on Smith chart and its utilization for the calculation of reflection coefficient, the input impedance and the SWR. Utilization of the Smith chart for the design of microwave circuits. Fundamentals on waveguides • Waveguide types – Rectangular, cylindrical, dielectric and plasmonic. • Rectangular and cylindrical waveguides – Propagation modes, Cut-off frequency, propagation constant, dispersion diagram, characteristic impedance, phase velocity, group velocity, finite conductivity losses. Dielectric waveguides. Planar transmission lines • Integrated microwave circuits – Planar transmission line circuits and their advantages in microwave frequencies. • Strip line – Supported modes and characteristic impedance, dispersion diagram and losses. The concept of effective width. • Microstrip transmission line – Supported modes and characteristic impedance, dispersion diagram and losses. The concepts of effective dielectric constant and parasitic radiation. • Other planar transmission lines– Alternative planar transmission lines such as slot lines and co-planar waveguides. Transmission line parameters • Transmission line parameters – Parameters for the description of microwave circuits, scattering parameters, ABCD parameters and their relationship.

LEARNING OUTCOMES / GENERAL COMPETENCES	The lesson includes the fundamentals of transmission lines, waveguide structures and microwave circuits. The main targets of this lesson are divided into three categories. 1. The first target is the understanding of the basic characteristic metrics that are utilized for assessing the functionality of transmission lines along with the basic analysis techniques for investigating their performance. In parallel, students will get familiar with the most utilized waveguiding structures, their applications and the fundamental configurations for achieving impedance matching, while they will get familiar with the utilization of the Smith chart. 2. The second target is to offer the capability of analyzing microwave circuits and designing realistic systems based on specific demands and being aligned with the relevant applications. For this purpose, students are getting familiar with the utilization of the Smith chart and the analysis of microwave circuits through PC. 3. Finally, the lesson also targets to the practical familiarization of the students with realistic microwave structures and circuits through laboratory exercises. Upon the successful completion of this course, students will be able to: • Understand the basic concepts of transmission lines, the functionality of waveguiding structures and calculating the associated parameters, • Categorize and analyze planar transmission lines, • Utilize the Smith chart for extract the characteristic performance parameters through it, • Utilize matching techniques depending on the application and calculate the associated parameters, • Analyze the response of microwave circuits, • Categorize and utilize microwave components depending on the application, • Design simple waveguiding structures, • Recognize and characterize realistic microwave structures.
PREREQUISITES	-
TEACHING METHODS	• Face to face • Possibility of remote education

ASSESSMENT METHODS	The final degree is calculated from the summation of a final written examination (80%) and the laboratory exercise degree (20%), that is derived from the laboratory student reports. There is a need of a degree of 5 out of 10, or greater for considering the examination as successful. Moreover, the possibility of optional semester exercises can be given that can offer an additive degree, in the case that the degree of the written examination exceeds 5. Students' evaluation means: • Written examination through short-answer questions (Formative, conclusive) • Written examination through open-ended questions (Formative, conclusive) • Written work (Formative, conclusive) • Written examination via problem solving (Formative, conclusive) The utilization of multiple literature sources is realized whereas the students are being monitored while executing the laboratory exercises. The final evaluation is being announced through the electronic course platform, where all the students that have are officially listed to the course have access. Moreover, after the evaluation announcement, timeslots for discussion regarding the examination are set, so that the students see their exam answers and any possible mistakes. The outline of the course, the course targets and the valuation criteria are announced both orally during the lectures and through the course website (e-Class).
LANGUAGE OF INSTRUCTION/EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Μικροκύματα, Γιούλτσης Τραϊανός - Κριεζής Εμμανουήλ, Εκδοσεις Α. Τζιολα & Υιοι Α.Ε., 2016, Κωδ. Εύδοξου [59379582] 2. Pozar David M., Μικροκυματική τεχνολογία, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ ΟΕ, 2004, κωδικός Εύδοξου [14664] 3. Collin Robert E., Μικροκύματα, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2005. 4. Ουζούνογλου Νικόλαος Κ., Εισαγωγή στα Μικροκύματα, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ, 1999, κωδικός Εύδοξου [9624] - Recommended Article/Paper Resources: IEEE Transactions on Microwave Theory and Techniques IEEE Journal of Microwaves IET Microwaves, Antennas & Propagation IEEE Microwave and Wireless Components Letters IEEE Microwave Magazine International Journal of Microwave and Wireless Technologies

DESIGN AND ANALYSIS OF COMPUTER NETWORKS

COURSE UNIT CODE	YH2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5^{th}
SEMESTER	9^{th}
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE390/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Lazaridis V.
COURSE CONTENTS	Issues of Design and Features of Transmission Control Protocol Level, Session, Presentation and Application according to OSI Model. Wide Area Network. Quality of Service (IntServ, DiffServ). TCP and UDP Protocol. Sockets. Transmission Level Connections. Flow Control. Introduction to Application Protocols. E-mail. FTP. DNS. Peer-to-peer Networks. Content Delivery Networks. World Wide Web. Use of Simulation Programs OPNET and NS-2.
LEARNING OUTCOMES / GENERAL COMPETENCES	After successful completion of the course, students will be able to: • comprehend modern techniques, protocols and computer network applications • search, analyze and substantiate basic issues and demands in order to construct effective computer networks • adjust their knowledge to new and emerging technologies, such as MPLS networks, cloud computing as well as modern Internet technologies, such as IPv6, IoT etc. based on the comprehension of the respective regulating
PREREQUISITES	-
TEACHING METHODS	Face to face Contemporary distance learning available
ASSESSMENT METHODS	Assessment method: Multiple-choice tests
LANGUAGE OF INSTRUCTION / EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Andrew S. Tanenbaum, *Δίκτυα Υπολογιστών*, 4η έκδοση, Εκδόσεις Κλειδάριθμος. 2. William Stallings, *Επικοινωνίες Υπολογιστών και Δεδομένων*, 6η έκδοση, Εκδόσεις Τζιόλα. 3. Douglas Comer, *Διαδίκτυα και Δίκτυα Υπολογιστών*, 4η έκδοση, Εκδόσεις Κλειδάριθμος. 4. Douglas Comer, *Διαδίκτυα με TCP/IP (Α Τόμος)*, 4η έκδοση, Εκδόσεις Κλειδάριθμος. 5. Jean Walrand, *Δίκτυα Επικοινωνιών*, Εκδόσεις Παπασωτηρίου

MANAGEMENT AND OPTIMIZATION OF COMMUNICATION NETWORKS

COURSE UNIT CODE	E35
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE292/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Michalas A.
COURSE CONTENTS	The aim of the course is twofold: Initially the course focuses on the techniques of management and evaluation of communication networks as well as their applications, through the presentation of methods and models for managing and monitoring the performance of networks. Following, the course covers the theory of telecommunications network optimization, where methods and algorithms are presented, which take into account the limitations of the network, as well as the requirements of the supported

LEARNING OUTCOMES / GENERAL COMPETENCES	1. acquiring knowledge concerning fault management, performance, security, and telecommunications networking configurations, 2. the acquisition of knowledge on the techniques of management, and evaluation of communication networks, 3. understanding of management methods through the presentation of methods and models of managing and monitoring network performance, 4. the acquisition of knowledge and the evaluation of network monitoring and management protocols 5. the acquisition of knowledge on graph theory and its application in optimization processes, 6. the acquisition of knowledge and evaluation of the process of solving basic problems of telecommunication networks, such as the problem of minimum route, maximum flow, minimum cost, etc, 7. the acquisition of knowledge and evaluation of optimization problem solving methods. 8. the analysis of the problems and the evaluation of the methods of solving non-linear optimization of telecommunication networks.
PREREQUISITES	Telecommunication Networks and Computer Networks I.
TEACHING METHODS	• Theoretical treatment in class, aided by active discussion and participation of students. • Teaching material is presented by Power-Point presentations. • Laboratory exercises are provided for understanding the course material.
ASSESSMENT METHODS	Final examination weighted at 30%, examination of laboratory exercises weighted at 30% and examination of the course assignment weighted at 40%. 1. The final exam includes: - Multiple choice questions. - Problem solving by applying the acquired knowledge. - Comparative evaluation of theoretical issues. 2. The examination of the laboratory exercises includes the evaluation of the laboratory skills acquired using laboratory equipment and network simulation tools. 3. The examination of the course assignment includes the evaluation of an extensive written report provided by the student on topics presented by the international scientific literature.

LANGUAGE OF INSTRUCTION/	Greek
RECOMMENDED BIBLIOGRAPHY	Recommended Book Resources: 1. "Computer Networking: A Top-Down Approach" ,7th edition - Pearson. 2. "Computer Networks and Internets", Douglas E. Comer, 6th Edition- Pearson. 3. "Computer Networks: A Systems Approach ", L.L. Peterson & B.S. Davie, Open Textbook Library - 6th Edition. Recommended Article/Paper Resources: 4. CCNA: Introduction to Networks 5. CCNA: Routing, Switching and Wireless Essentials 6. CCNA: Enterprise Networking, Security, and Automation 7. «Ανάπτυξη και διαχείριση δικτύων υπολογιστών», Π. Φουληράς, Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα, 2015 (Κωδικός Βιβλίου στον Εύδοξο: 320059) 8. Dimitri P. Bertsekas, Network Optimization: Continuous and Discrete Models, Athena Scientific, 1998.

NEXT GENERATION NETWORKS AND SERVICES

COURSE UNIT CODE	E3
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE173/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Louta M.
COURSE CONTENTS	Next Generation Networks and Services. Research Issues and Challenges. Architectural Frameworks, Protocols, Standards. Heterogeneous Networks. Access networks and services. xDSL, FTTx, WiMAX, LTE, LTE-Advanced, small cell networks, ultra dense cellular networks, ad-hoc networks, wireless sensor networks, B3G/4G/5G/6G. Mobility Management. Always Best Connectivity Principle. Service Creation and Provisioning (IN, DPE, TINA, Parlay OSA, CAMEL, IMS, SIP). Network and Service Management. Emerging topics. Context aware networks and services, self-organizing networks, autonomous and cognitive networks, cooperative networks, overlay networks, peer networks, social networking, future internet, internet of things, opportunistic networks, content dissemination networks. Service configuration. Ubiquitous and personalized services.

LEARNING OUTCOMES / GENERAL COMPETENCES	The course objective is the presentation of the latest developments and the state-of-the-art solutions in the field of next generation networks and services. In this context, a wide range of issues are addressed, aiming to cover technologies, techniques and methods that could be adopted for the design, development, management and evaluation of next generation networks and creation, provisioning and management of services. Research challenges and issues that should be addressed are indicated, while potential solutions are highlighted. The students actively participate, while their research activity is reinforced. During the semester they study and present research papers from related literature and conduct a survey on a selected topic. Upon successful completion of the course, students will acquire the following knowledge, skills and competence: • to explain, classify, evaluate the technologies and methods used to design, deploy and manage next generation networks and services, • to highlight, organize, classify, analyze and evaluate challenges and open issues that should be successfully addressed concerning design, deployment and management of next generation networks and services, • to highlight, organize, classify, organize and evaluate potential solutions concerning design, deployment and management of next generation networks and services.
PREREQUISITES	-
TEACHING METHODS	Face to face, supported by e-learning asynchronous & synchronous). The course is taught via lectures, while students actively participate. The lectures are supported with presentations in power point, which are available to the students via the asynchronous tele-education platform. During the semester, students' study and present papers from related research literature. Additionally, students write and present a survey on a selected topic.

ASSESSMENT METHODS	Course assessment is conducted through: a) written exams taking place at the end of the semester, including questions (both open and multiple choice) (30%), b) presentation of papers from related research literature (30%) and c) writing and presentation of a survey on a selected topic (40%). Language of evaluation: Greek Defined evaluation criteria are announced during the first lecture and are accessible to the students through the asynchronous tele-education platform.
LANGUAGE OF INSTRUCTION/EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Χ. Βασιλόπουλος, κ.α., Δίκτυα Πρόσβασης Νέας Γενιάς, Εκδόσεις Κλειδάριθμος, 2010. 2. A. Jeffrey, G. Ghosh, A. Muhamed, Κ. Τσουκάτος, Βασικές αρχές WiMAX, Εκδόσεις Παπασωτηρίου, 2010. 3. Olga Galinina, Sergey Andreev, Sergey Balandin, Yevgeni Koucheryavy, Internet of Things, Smart Spaces, and Next Generation Networks and Systems, 1st edition, 2019, electronic resource. 4. Massimo Tornatore, Gee-Kung Chang, Georgios Ellinas, Fiber-Wireless Convergence in Next-Generation Communication Networks, 2017, electronic resource. -Scientific journals IEEE Communications Magazine, IEEE Wireless Communications Magazine, IEEE Transactions on Wireless Communications Journal, IEEE Communications Surveys and Tutorials Journal, IEEE Network Magazine, IEEE Transactions on Service Computing, IEEE Internet of Things Journal, Emerging Telecommunication Technologies Journal, International Journal of Communication Systems, κ.α.

MOBILE COMPUTING

COURSE UNIT CODE	E24
COURSE UNIT TYPE	Specific Background
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE238/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	S. Amanatiadis
COURSE CONTENTS	The Mobile Computing course targets to provide knowledge on mobile computing aspects, such as: a) protocols related to mobile networks (communication, clustering routing), b) methods for management and storing data in mobile networks, c) mobile phone operating systems, d) services related to mobile computing (e.g., location services, IoT), e) design methods for mobile computing apps, f) programming mobile devices, g) design and implementation of mobile apps using the Android platform.
LEARNING OUTCOMES / GENERAL COMPETENCES	• Principles of mobile computing • Knowledge on communication protocols, clustering methods, and routing in mobile networks • Knowledge on data management methods for mobile computing • Knowledge on mobile computing services • Knowledge on operating systems and platforms of cellular phones • Principles of mobile cloud computing and mobile edge computing • Knowledge on app design principles using the Android platform
PREREQUISITES	-
TEACHING METHODS	Lectures, Labs, Projects
ASSESSMENT METHODS	Assignments (30%) Final exams (70%)

LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. M. Theologou, Mobile and Personal Networks, , 2nd edition, 2010. 2. Conder, Shane, Darcey, Lauren, Android app development, 2nd edition, 2011. 3. Stallings William, Wireless Communications and Networks, 1st edition, 2016.

REMOTE SENSING

COURSE UNIT CODE	E42
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE310/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	

COURSE CONTENTS

Theoretical knowledge such as satellite systems, multispectral satellite images, color composites. geometric and radiometric errors, spectral signatures, methods of supervised and unsupervised classification, and accuracy assessment complete the theoretical background. Practical experience in managing and analysis of satellite data is realized with laboratory exercises that are accomplished via a specific software.

The course consists of these parts:

1) Basic principles: definition, history, electromagnetic spectrum, structure of multispectral satellite images, resolution (spatial, temporal, radiometric, spectral).

2) Aerial photographs: cameras, films, photo interpretation, photogrammetry, 3D photographs, distortions, ortho-maps, organizations providing aerial photos.

3) Sensors and satellites: sensors, passive and active, low medium high and very high spatial resolution, optical, hyperspectral, radar sensors, satellites, Landsat-SPOT-IKONOS satellite images.

4) Preprocessing of satellite images: geometric errors, geometric corrections, Greek, European and global coordinate reference systems, Global Positioning System (GPS).

5) Radiometric and atmospheric correction: radiometric errors, radiometric enhancement

6) Satellite images histograms: linear stretching, logarithmic and exponential stretching, piecewise linear stretching, histogram equalization, histogram matching, histogram slicing.

7) Multispectral image transformations: Numerical and logical operations, indexes, principal component analysis, Kauth Thomas transformation.

8) Spatial enhancement with filters: description and different kinds of filters, filters based on statistical measures, edge optimization filter, directional filter, textural filter etc.

9) Image fusion: resolution merge, pan sharpening (example)

10) Spectral signatures: radiation, radiometric measurements and main land cover spectral signatures.

11) Classifications: definition, unsupervised and supervised classifications accuracy assessment, classification via artificial intelligence, comparison with classic methods, neural network classification.

12) Sampling and accuracy estimation: truth is rarely pure and never simple. How many samples? Contingency table.

13) Trends and applications: todays and future applications and sensors, data in remote sensing, radar images of very high spatial resolution, unmanned aerial vehicles.

LEARNING OUTCOMES / GENERAL COMPETENCES	Remote Sensing is a scientific field based theoretically and practically at the processing of digital multispectral images issues from satellites. Specific software is dedicated to satellite image analysis. Students will be able to: -Understand the structure of multispectral satellite images and apply processing methods for this kind of images. -Compose various color composite images issues from different combination of spectral band aiming at recognising specific land covers of the earth surface. -Acquire the knowledge of geometric and radiometric corrections of satellite images. -Make the optimum choice of different land cover sampling areas in order to extract their spectral signatures. -Apply unsupervised classifications of satellite images. -Apply supervised classifications of satellite images. -Control and use technological tools (Cross Classification Table, KHAT Index, etc) in order to measure the applied classification accuracy. -To accomplish specific thematic research in Remote Sensing as temporal changes, natural disaster estimation, but also to be able to resolve technical matters as filter optimization, boolean algebra operations in digital binary images.
PREREQUISITES	-
TEACHING METHODS	face to face.
ASSESSMENT METHODS	60% Final Theory Exams, 40% Semester Assignments.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Brandt Tso and Paul M. Mather 2001, *Classification methods for remotely sensed data*, Taylor & Francis. 2. Paul J. Gibson and Clare H. Power, 2000, *Introductory remote sensing: digital image processing and applications*. 3. D. Wilkie, J. Finn, 1996, *Remote sensing imagery for natural RECOMMENDED BIBLIOGRAPHY monitoring: A guide for first-time users*, Columbia University Press. 4. Paul M. Mather, 1989, *Computer processing of remotely-sensed images: An introduction*, John Wiley & Sons. 5. A. Cracknell, L. Hayes, 1993, *Introduction to remote sensing*.

7TH SEMESTER – DIVISION OF COMPUTERS

AUTOMATIC CONTROL SYSTEMS II

COURSE UNIT CODE	YYH1
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE367/
TEACHING WEEKLY HOURS	5
INSTRUCTORS	Parisis K.
COURSE CONTENTS	The CS II course is the continuation of the CS I course. Its main purpose is to demonstrate the practical value and applications of control systems theory and to provide students with useful knowledge of immediate application. The course is combined with the use of appropriate software to solve automatic control problems. Includes sections: Frequency domain systems analysis methods. Stability in the frequency domain. Design of feedback control systems with Root Locus and Bode Diagrams (Phase-Lead, Phase-Lag, three terms (Proportional - Integral – Differential (PID) controllers). Prefilters. Design of state variable feedback systems (controllability and observability, full-state feedback, observer design, optimal control systems, internal model design).

LEARNING OUTCOMES / GENERAL COMPETENCES	The purpose of this course is to provide the student with a comprehensive introduction to the theory and applications of Control Systems with emphasis in design. The student will deal with the simulation of physical systems on a computer and finding the proper controller through assignments and solving selected exercises. In addition, the student will complete a series of selected laboratory exercises covering all the different types of compensators in control systems. Upon successful completion of this course the student will be able to: 1. Identify and describe the different types of compensators. 2. Understand and explain their operation in the closed loop system. 3. Analyze and design a control system (via transfer functions and state equations). 4. Compare and evaluate the designed control system based on set design specifications. 5. Implement compensator circuits. 6. Implement experimental devices in the laboratory and analyze their operation. 7. Simulate on PC and explain the operation of control systems.
PREREQUISITES	Knowledge of the course is required: Applied Mathematics I Control System I
TEACHING METHODS	Face to Face Lectures, assignments, Laboratory
ASSESSMENT METHODS	I. Written final examination (60%) comprising: - Solving problems related to quantitative data II. Individual work (10%). III. Final laboratory test (30%).
LANGUAGE OF INSTRUCTION/ EXAMS	Greek (in English to Erasmus students)

RECOMMENDED BIBLIOGRAPHY	1. Σύγχρονα Συστήματα Αυτομάτου Ελέγχου, 13η Έκδοση, Dorf Richard C., Bishop Robert H., ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2017. 2. Συστήματα Αυτομάτου Ελέγχου, Ogata K., ΓΡΗΓΟΡΙΟΣ ΧΡΥΣΟ-ΣΤΟΜΟΥ ΦΟΥΝΤΑΣ, 2011. 3. Συστήματα Αυτομάτου Ελέγχου, 2η Έκδοση, Μαλατέστας Παντελής, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2017. 4. Πετρίδης Βασίλειος, Συστήματα Αυτόματου Ελέγχου. Τόμος Β. Ζήτη Πελαγία & Σια Ι.Κ.Ε.. 5. G. F. Franklin and al, Feedback control of Dynamic Systems, 5th ed., Pearson Prentice Hall, 2006. 6. Π. Ν. Παρασκευόπουλος, Εισαγωγή στον Αυτόματο Έλεγχο. Τόμος Α Θεωρία, Αθήνα 2001.

Operating Systems

COURSE UNIT CODE	MK22
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE189/ & http://arch.icte.uowm.gr/courses/os/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Lazaridis V.
COURSE CONTENTS	Fundamental Issues in Operating Systems. History & Evolution of OS. Processes & Scheduling. Synchronization. Interprocess Communication. Simultaneous Processes/Threads. Mutual Exclusion. Memory Management. Paging. Virtual Memory. Filesystem Management. Resource Management. Deadlocks & Livelocks. Input/Output Management. Protection and Security Issues. Widows & Unix Operating Systems. Laboratory assignments consist of windows & Linux shell scripts and operating system programming in POSIX.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: •the historical development of operating systems, •the various process states and context switching, •the benefits of using an operating system, •how applications interact with the operating system and each other •the major operating system modules (process management, deadlock, storage management, paging, caching, virtual memory, file system, protection and security), •the scheduling algorithms, •the filesystem operations, •the memory paging and segmentation, •the input/output mechanisms, From the laboratory assignments, students will gain the abilities to: •fully utilize and program the Microsoft windows and Unix shell using scripts, •fully utilize the UNIX operating systems as a development platform for POSIX C, •use all the major POSIX system calls for designing single or multithreaded, host only or interconnected processes, •write programs that interface to the operating system at the system-call level, •use a variety of user level tools to monitor the behavior of operating systems.
PREREQUISITES	Computer Architecture (not compulsory)
TEACHING METHODS	Lectures, PowerPoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, open courses video lectures, laboratory exercises, semester group project.

ASSESSMENT METHODS	The final grade is the sum of the laboratory grade and theory grade. The Maximum for these grades is 5, totaling both in 10. The students have to pass the Laboratory (at least 2.5/5) and Theory (at least 2.5/5), and also be present at the 85% of the laboratory sessions. Theory Examination (max 5 grades) • Multiple Choice Questions Examination – 3 • Theory Exercises – 2 Lab Examination (max 5 grades) • Labpoints (completing code challenges) - 2 • Semester Project - 2 • Lab Examination (code writing) - 1
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Andrew S. Tanenbaum, *Συγχρονα Λειτουργικα Συστηματα*, Εκδο-σεις Κλειδαριθμος Επε, 2009. 2. Stallings W., *Λειτουργικά Συστήματα*, Εκδ. Τζιολα & Υιοι, 2009. 3. M. Rochkind, *Προγραμματισμος Σε Unix*, Εκδ. Κλειδαριθμος, 2007. 4. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Λειτουργι-*

ARTIFICIAL INTELLIGENCE

COURSE UNIT CODE	Y1
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4^{th}
SEMESTER	7^{th}
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE107/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Stergiou K.
COURSE CONTENTS	Introduction to Artificial Intelligence. Intelligent Agents. Blind Search, Heuristic Search, Local Search, Constraint Satisfaction Problems. Propositional Logic: Syntax and Semantics, Logical Inference, Proof Methods, Resolution. Predicate Logic: Syntax and Semantics. Planning: Basic Principles and Algorithms. Machine Learning: Inductive Learning, Decision Trees.

LEARNING OUTCOMES / GENERAL COMPETENCES	The expected learning outcomes are the following: 1. Understanding of basic concepts of Artificial Intelligence and Intelligent Systems. 2. Understanding methods of solving search problems in Artificial Intelligence. 3. Application of methods of solving to unknown problems. 4. Understanding of basic approaches to Knowledge Representation. 5. Develop experience in the implementation of search algorithms and logical inference. 6. Development of creative thinking. 7. Development of problem-solving skills. 8. Gain experience in collaborative management and problem solving. Upon successful completion of the course, students will: 1. understand the basics of intelligent systems 2. know how to implement uninformed and informed search algorithms 3. are capable of reasoning in propositional logic 4. know the basic principles of action planning 5. understand the basics of machine learning
PREREQUISITES	-
TEACHING METHODS	Lectures, exercises, projects
ASSESSMENT METHODS	The evaluation is done through: 1. written examination at the end of the semester that includes short answer questions and resolution of exercises 2. scoring the report and the code of the work carried out during the semester 3. oral presentation of the work carried out during the semester The evaluation criteria are as follows: • correctness • clarity • accuracy • efficiency
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Russell & Norvig, Τεχνητή Νοημοσύνη: Μια Σύγχρονη Προσέγγιση, Κλειδάριθμος, 2004 2. Βλαχάβας, Κεφαλάς, Βασιλειάδης, Κόκκορας, Σακελλαρίου, Τεχνητή Νοημοσύνη, Εκδόσεις Πανεπιστημίου Μακεδονίας, Γ' Έκδοση. - Recommended Article/Paper Resources: Artificial Intelligence, Journal of Artificial Intelligence Research, Machine Learning, Journal of Automated Reasoning, Autonomous Agents & Multi-Agent Systems, AI Communications

ROBOTICS

COURSE UNIT CODE	E4
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE348/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Fragulis G.
COURSE CONTENTS	Origin of robotics. Building robots, Geometrical Features. Kinetic solids. Direct kinematic problem. Denavit-Hartenberg Method. Inverse kinematic problem. Calculation of Jacobian matrix. Direct and inverse kinematic problem, velocity acceleration. Position Control and Speed of Robots, Controllers and PID automatic control robots. Position control, Trajectory planning.
LEARNING OUTCOMES / GENERAL COMPETENCES	Familiarize the student with the basic concepts of robotics with special emphasis on solving the main kinematic (position and velocity) problems of a robotic arm. After completion of this course the student will have the ability to understand basic robotics concepts, make kinematics analysis, position, velocity and acceleration robotic arm, to design controllers and plan trajectories of robotic arms. Retrieve, analyse and synthesise data and information, with the use of necessary technologies . Adapt to new situations. Make decisions. Work autonomously. Work in teams. Work in an international context. Appreciate diversity and multiculturality. Respect natural environment. Be critical and self-critical. Advance free, creative and causative thinking. Retrieve, analyse and synthesise data and information, with the use of necessary technologies. Advance free, creative and causative thinking.
PREREQUISITES	-
TEACHING METHODS	Lectures using PowerPoint slides, Distance Learning using e-class platform.

ASSESSMENT METHODS	Written final examination (80%): - Multiple-choice questions - Short Answers - Laboratory Work Atomic / group project work (20%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Εισαγωγή στη Ρομποτική, 4η Έκδοση, Craig John 2. Ρομποτική, 4η Έκδοση, Εμίρης Δημήτριος, Κουλουριώτης Δ. 3. Ρομποτική, Ιωάννης Μπούταλης 4. ΡΟΜΠΟΤΙΚΗ, SICILIANO,SCIAVICCO,VILLANI,ORIOLO

INDUSTRIAL COMMUNICATIONS

COURSE UNIT CODE	EYH1
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY110/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Gavros K.
COURSE CONTENTS	Part One GENERAL PRINCIPLES OF LOCAL NETWORKS 1. DEVELOPMENT OF INDUSTRIAL AUTOMATION 2. ADVANTAGES OF COMMUNICATION NETWORKS IN INDUSTRY 3. HIERARCHICAL CONTROL AND COMMUNICATION NETWORKS 4. DATA HANDLING IN INDUSTRIAL LANs 5. TOPOLOGIES OF LANs 6. DATA MEDIA IN LANs 7. MODES FOR DATA TRANSMISSION IN LANs 8. METHODS OF ACCESS TO THE LANS CHANNEL 9. ISO / OSI OPEN COMMUNICATION MODEL 10. COMPONENTS OF NETWORK ARCHITECTURE Part 2 INDUSTRIAL NETWORKS 1. MODBUS NETWORK 2. ETHERNET NETWORK 3. CAN OPEN NETWORK 4. BRIEF DESCRIPTION OF OTHER COMMUNICATION PROTOCOLS USED IN INDUSTRIAL APPLICATIONS PROCESSES.

LEARNING OUTCOMES / GENERAL COMPETENCES	On successful completion of this course the student will be able to: • Recognize and describe the Industrial network devices • Explain the principles of Industrial network • Explain in detail the basic functions of all types of Industrial Components • Implement experiments in the laboratory and analyze their operation • Simulate basic Industrial network • Design simple industrial network system. • Demonstrate the ability to use network topologies in various practical applications • Collaborates with fellow students in project development • Constructs simple Industrial network using the Lab equipment.
PREREQUISITES	-
TEACHING METHODS	• Face to face • Possibility of distance education
ASSESSMENT METHODS	The grade of the course theory derives from the grade of the written examination as well as that of the possible progress exams. The grade of the course laboratory is that of the final exam (Project), in which the quality of the delivered assignments is taken into account qualitatively. The final grade of the course is calculated indicatively based on the following equation. Final grade = 0.75 (Theory grade) +0.25 (laboratory grade), if (THEORY grade) ≥ 5.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. INDUSTRIAL NETWORKS AND ADVANCED PLC PROGRAMMING BY CHRISTOS B. PAPAZACHARIAS [ISBN: 978-960-98307-1-3] 2. INDUSTRIAL NETWORKS USING PLCs A. MANESE PATRA 2003 3. DATA COMMUNICATIONS AND NETWORKING Behrouz A. Forouzan Fourth Edition McGraw-Hill

DIGITAL ELECTRONICS

COURSE UNIT CODE	E47
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE333/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Dasygenis M.
COURSE CONTENTS	The course aims to familiarize students with digital logic, synthesis and analysis of combinational circuits, learning the basics of sequential circuits and introduction to the techniques of design and implementation of digital circuits.
LEARNING OUTCOMES / GENERAL COMPETENCES	After the lectures the students: -will be familiar with the theory and operating principles of sequential digital circuits. -will be familiar with the principles of design and design of sequential digital electronic circuits. -will have understood the basic theory and principles of design and study of sequential digital electronic circuits. The laboratory part of the course includes the design of laboratory exercises and practical applications for the better understanding and familiarization of students with the basic theory and techniques that are necessary for the implementation of digital electronic circuits. Students acquire the ability to instantly recognize known circuits to be able to understand the operation of the equipment. Students are trained to identify faults in the aforementioned circuits. The knowledge of the course can be used so that students are able to create their own Amplifier circuits.
PREREQUISITES	-

TEACHING METHODS	Lectures, Power Point slide presentations, presentation simulations of technological applications. Assignments in groups for students to better understand the concepts and basic principles of digital logic
ASSESSMENT METHODS	Assignments to students in groups. The grade that will result from them will be 20% of the final grade. 80% will result from the written final examination of the course
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Ψηφιακή Σχεδίαση, Mano Morris, Ciletti Michael 2. Μικροηλεκτρονική, Jaeger Richard - Blalock Travis 3. Μικροηλεκτρονικά κυκλώματα τόμος Β ADEL. S. SEDRA & KENNETH C. SMITH 4. KLEITZ, W., Ψηφιακά Ηλεκτρονικά, , Εκδόσεις Τζίολα, 2013.

OBJECT ORIENTED PROGRAMMING II

COURSE UNIT CODE	MK31
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE195/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Bibi S.

COURSE CONTENTS	The course focuses on Object Oriented Programming with C ++ programming language. Emphasis is placed on the object-oriented programming model, as well as on some more advanced programming concepts (references, parameterization, dynamic memory allocation, friend functions). Students learn to design and implement object-oriented programs (classes, objects, encapsulation, subtraction, composition, hierarchies and inheritance, polymorphism) in C++. By the end of the course students should be familiar with the advanced features of C++ and be able to design and implement complex programs of increased degree of difficulty. Course modules: • Section 1: Basic Concepts of Object-Oriented Programming, Java Comparison, C ++ History and Applications • Section 2: C ++ Code Development, Objects and Classes, Constructor Functions, Input/Output • Section 3: Classes & Objects, Objects as Arguments, Constructor's overloading, Data Access Member Functions. • Section 4: Global Functions, Friend Functions, Static Functions, *this pointer • Section 5: Operator Overloading, Arguments and Return Values, Binary Operator Overloading (Numerical Operators, Comparison Operators, Input/Output Operators overloading) • Section 6: Arrays, arrays as class member data, arrays of objects • Section 7: Composition, objects as data members of classes, how to handle objects, examples of using composition • Module 8: Inheritance, base and derived classes, access of base class members and functions, member functions overloading • Section 9: Pointers, new and delete operators, object pointers, member references, pointers to arrays of objects • Section 10: Class Hierarchies, Abstract Base Classes. Public and private inheritance. • Section 11: Inheritance Levels, Multiple Inheritance, Classes within Classes • Section 12: Files and streams, object input / output, file pointers. • Section 13: Templates, Genetic Programming, Code Reuse, Class and Function Templates.

LEARNING OUTCOMES / GENERAL COMPETENCES	Students who successfully complete the Object-Oriented Programming II course should be able to: • Classify and understand existing programming models. • Implement relationships between classes, such as inheritance, composition, polymorphism, c ++ language content. • Overload input/output operators, arithmetic operators, comparison operators. • Handle global, friend and class member functions • Successfully use const, static, final variables and functions. • Store and retrieve information in text and binary files. • Perform dynamic memory allocation, manipulate pointers. • Implement templates
PREREQUISITES	-
TEACHING METHODS	Lectures and Labs
ASSESSMENT METHODS	The evaluation of students is carried out with: • Written evaluation • Laboratory examination • Application Development (Semester Project) The written evaluation is intended to examine the students' knowledge of the taught material and to capture the degree of its assimilation. It includes multiple choice questions, free questions but also short answers, code evaluation, code development. The purpose of the laboratory exams is to determine degree of familiarity of students with the development of C ++ applications in real life problems. It includes short application development. The application development (Semester project) is assigned in groups of 2 persons and include application development in C ++. The works are submitted electronically via e-class platform. The final evaluation of the students is as follows: 60% Grade of written examination + 20% Grade of application development + 20% Grade of Laboratory examination

LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	Books (in Greek) 1. Savitch Walter, Absolute C++, Pearson. 2. B. Stroustrup, The C++ Programming Language, Addison Wesley. 3. S. Al, W. Clayton, " C++ Programming Bible", Wiley. Journals Science of Computer programming, Elsevier Journal of Systems and Software, Elsevier Proceedings of the ACM on Programming Languages, ACM

COMPUTER GRAPHICS

COURSE UNIT CODE	E34
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE275/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Protopsaltis A.
COURSE CONTENTS	Fundamental computer graphics concepts and their applications. Rasterization Algorithms. 2D and 3D Coordinate Systems and Transformations. Projections and Viewing Transformations. Culling and Hidden Surface Elimination Algorithms. Model Representation and Simplification. Parametric Curves and Surfaces. Scene Management. Color in Graphics and Visualization. Illumination Models and Algorithms. Shadows. Texturing. Basic Animation Techniques. Laboratory:
LEARNING OUTCOMES / GENERAL COMPETENCES	To understand the two- and three-dimensional geometry, learn the principles, algorithms and techniques, for designing, coloring, and lighting of real-time - photorealistic graphics. Students will have the opportunity to develop interactive 3D graphics rendering and visualization software through the laboratory course of programming graphics in OpenGL / C ++.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Laboratory exercises • Possibility of remote courses

ASSESSMENT METHODS	• Formative assessment • Multiple choice tests • Short-answer questions • Problem solving • Laboratory work • Oral exam
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Theocharis T., Platis N., Papaioannou G., Patrikalakis N., Graphics and Visualization S. Athanasopoulos et al, A’ Publication/2010 2. Bakers H., Computer Graphics with Open GL, Publisher A. Tziola, 3rd ed. /2010

eHealth

COURSE UNIT CODE	E2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE128/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Aggelidis P.
COURSE CONTENTS	Introduction to e-health and related concepts (including medical IT and knowledge management based on information technology): What is it? Why is it so important? The main research and policy issues in the application of information systems in health care, including the analysis of challenges and opportunities as well as an overview of specific tools such as patient electronic file systems and computer decision support systems. Basic principles in Medical Data Management. Computational Statistics. Introduction to clinical quality development as an integral part of clinical information systems. Online health care. Providing and requesting medical information online, medical interventions via internet (such as tele-therapy) and peer-to-peer support networks (p2p) in virtual e Health medical communities. The use of online search methods and the use of the Internet in support of clinical trials. Health Portals. Telemedicine services and applications. Mobile and Wireless Communications in Health Care. Introduction to medical vocational training using the internet and internships for health professionals. EHealth safety. Basics for Privacy & Confidentiality of Health Care. Moral values.

LEARNING OUTCOMES / GENERAL COMPETENCES	The aim of the course is the introduction to the evolving field of e-Health, which constitute the application of the principles of information technology and telecommunications to provide problems solutions and address the challenges of Prevention, Treatment and Health Quality. Due to the interdisciplinary nature of the course, students come into contact with different scientific fields, such as biology, medicine and the use of appropriate devices and software to study and analyze their problems. The course covers all current trends, such as e-wellness, independent living, Health 2.0, MedSocApps. Introduction to e-Health. Definition & importance of e-Health. Main research and policy issues to the application of informatics in medical care. Overview of basic specialized tools, like electronic patient systems and decision support systems. Management of medical data. Statistical informatics. Introduction to clinical quality development as a part of clinical system informatics. Web-based medical care. Online supply and demand of medical information, medical consultation through internet (like e-therapy) and p2p virtual medical societies. The usage of search engines and internet in clinical trials. Health Portals. eHealth services and applications. Mobile and wireless communication in medical care. Introduction to medical Vocational Education and Training through internet. Safety in eHealth. Privacy and confidentiality in medical care. Ethical principals.
PREREQUISITES	-
TEACHING METHODS	Lectures Labs Remote
ASSESSMENT METHODS	**Method description** / **Semester Workload** Lecture 26 Laboratory 26 Project 30 Autonomous study 43 **Total** **125**
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. PANTELIS ANGELIDIS, Medical Informatics volume A, 2011. 2. Athena Lazakidou, Advanced IT Systems and Services in the Field of Health, ATHENS LAZAKIDOU, 2009.

DATA ANALYSIS

COURSE UNIT CODE	EYH8
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY121/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	
COURSE CONTENTS	The course consists of these parts: Overview of confidence intervals and Statistical tests. Methodological applications and numerical examples. Sampling methods: Probability and supervised Sampling. Main Probability sampling methods: Simple Random Sampling, Stratified Random Sampling and Systematic Sampling methods and numerical examples. Regression Analysis: simple linear regression, linear model coefficients, correlation coefficient, Analysis of Variance (ANOVA). Various regression models: Parabolic, exponential, and multiple regression. Applications using SPSS or PSPP or EXCEL software. Principal Component Analysis: Data normalization, correlation matrix, Eigen values and Eigen vectors, New Axes Inertia percentage calculation. Items Coordinates on new components. Numerical example using SPSS software(factor). Clustering methods: Hierarchical and not hierarchical clustering methods. Nearest neighbor, Lance and Williams method. K-means clustering method: Euclidian distance analysis between items, group centers and between each item from groups centers. Numerical example using the SPSS statistical software.

LEARNING OUTCOMES / GENERAL COMPETENCES	systematic data registration and analysis and applicable conclusion extraction by acquiring a solid theoretical background of contemporary methodologies (using sell known specific software), such as: Probabilistic and supervised sampling Correlation research between two or more variables Compact data in few variables having the maximum of variance Various methods of hierarchical and not clustering methods
PREREQUISITES	-
TEACHING METHODS	In real time, face to face.
ASSESSMENT METHODS	70% Final Theory Exams, 30% Semester Assignments.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Βιβλίο [94699890]: Στατιστική Επεξεργασία και Ανάλυση Πολυδιάστατων Δεδομένων ΙΙ, Χρήστος Κων/νου Φράγκος 2. Η ανάλυση δεδομένων, Παπαδημητρίου Γιάννης

8TH SEMESTER – DIVISION OF COMPUTERS & ELECTRONICS

Parallel and Distributed Systems

COURSE UNIT CODE	MK34
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE161/ https://arch.icte.uowm.gr/courses/parallel/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Dasygenis M.
COURSE CONTENTS	Introduction to Parallel Systems. History of Parallel and Distributed Systems. Von Neumann organization. Flynn taxonomy. Pipeline. Multi computer systems and multi-core. Distributed and shared memory. Uniform and non-uniform Memory Architectures. Performance estimation. Scaling. Interconnection networks. Laws of Grosch, Amdahl, Gustafson-Barsis. Designing and programming parallel applications. MPI. Synchronization. Dependencies Graph. Scheduling. Shared Memory coherence. MESI. Parallel Processing at GPU. Models and communication mechanisms of processes. Vector Processing. Cluster & Grid Computing. Parallelizing application examples. Synchronization issues. Laboratory assignments of parallel programming of OpenMPI, OpenMP, threads and CUDA.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: •the reasons that the sequential computing has been abandoned, •the similarities and differences of parallel architectures, •the CPU cores interconnection networks, •the memory coherency problems and the possible solutions, •the significance of the clock synchronization of distributed systems, •the multi-core CPU and GPU strengths and weaknesses, •the granularity of the parallel processing. From the laboratory assignments, students will gain the abilities to: •scale an application, •transform an application to exploit the available parallelism, •develop and debug parallel programs, •utilize the openmpi framework for distributed parallel systems, •utilize the openmp framework for shared memory parallel systems, •utilize the cuda framework for GPU parallel systems, •utilize the POSIX threads for shared memory parallel systems, •utilize a batch submission system for the grid, •utilize a batch submission system for a computer cluster, •analyze and locate application hotspots, •measure the performance of parallel and distributed systems, •identify the best architectures and system for solving a given
PREREQUISITES	Operating Systems (not compulsory), Computer Architecture (not compulsory)
TEACHING METHODS	Lectures, PowerPoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, open courses video lectures, laboratory exercises, semester group project.

ASSESSMENT METHODS	The final grade is the sum of the laboratory grade and theory grade. The Maximum for these grades is 5, totaling both in 10. The students have to pass the Laboratory (at least 2.5/5) and Theory (at least 2.5/5), and also be present at the 85% of the laboratory sessions. Theory Examination (max 5 grades) • Multiple Choice Questions Examination – 3 • Theory Exercises – 2 Lab Examination (max 5 grades) • Labpoints (completing code challenges) - 2 • Semester Project - 2
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Andrew S. Tanenbaum, Maarten Van Steen, *Κατανεμημενα Συστηματα: Αρχες Και Υποδειγματα*, Εκδοσεις Κλειδαριθμος, 2006. 2. David B. Kirk, Wen-Mei W. Hwu, *Προγραμματισμος Μαζικα Παραλληλων Επεξεργαστων*, Κλειδαριθμος, 2010. 3. Σ. Παπαδακης, Κ. Διαμανταρας, *Προγραμματισμος και Αρχιτε-*

Design and Analysis of Algorithms

COURSE UNIT CODE	MK37
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE332/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Ploskas N.
COURSE CONTENTS	Analysis of Algorithms. Complexity of Algorithms. Asymptotic Analysis. Design of Algorithms. Recursive Algorithms. Master Theorem. Divide-and-Conquer Algorithms. Dynamic Programming. Greedy Algorithms. Probabilistic Algorithms. Graph and Network Algorithms. Computational Complexity. P and NP classes. NP-completeness.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will: • to perform analysis of algorithms • to study algorithms in terms of their complexity • to perform asymptotic analysis of algorithms • to design and implement recursive and greedy algorithms • to design and implement algorithms by applying the principles of dynamic programming, • to understand and apply algorithms for graphs and networks • to understand the P and NP classes
PREREQUISITES	-
TEACHING METHODS	Lectures, labs

ASSESSMENT METHODS	The language of evaluation is Greek. The assessment method consists of three assignments (30%) and a final written examination (70%). The final examination includes multiple choice questions, short answer questions, and problem-solving questions. The three assignments require the implementation of algorithms in the C programming language. The above evaluation criteria are posted on the course website.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	Recommended Book Resources: 1. Thomas Cormen, Charles Leiserson, Ronald Rivest, Clifford Stein, Εισαγωγή στους αλγορίθμους, Πανεπιστημιακές Εκδόσεις Κρήτης, Έκδοση: 1η/2016 2. Sanjoy Dasgupta, Christos Papadimitriou, Umesh Vazirani, Αλγόριθμοι, Εκδόσεις Κλειδάριθμος, Έκδοση: 1η/2009 3. Παναγιώτης Μποζάνης, Αλγόριθμοι, Εκδόσεις Τζιόλα, Έκδοση: 2η/2017 4. Jon Kleinberg, Eva Tardos, Σχεδιασμός αλγορίθμων, Εκδόσεις Κλειδάριθμος, Έκδοση: 1η/2009 5. Anany Levitin, Ανάλυση και σχεδίαση αλγορίθμων, Εκδόσεις Τζιόλα, Έκδοση: 3η/2018 6. Κωνσταντίνος Παπαρρίζος, Ανάλυση και σχεδίαση αλγορίθμων, Εκδόσεις Τζιόλα, Έκδοση: 1η/2010 - Related Scientific Journals: 1. Algorithmica 2. Journal of Algorithms 3. ACM Transactions on Algorithms

SOFTWARE ENGINEERING

COURSE UNIT CODE	MK33
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4^{th}
SEMESTER	8^{th}
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE284/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Bibi S.

COURSE CONTENTS	The course deals with the following concepts: Introduction to software technology. Software development models. Software life cycle. Software requirements. Flowcharts, structure diagrams. Software design. Software coding and documentation. Software testing, control tools. Object-oriented systems software development, UML modeling language: Class and interaction diagrams. Status and activity chart. Systems specification models. Design Templates. Course modules: • Section 1: INTRODUCTION-BASIC CONCEPTS, definition of "Software Technology", software failures, common errors, software, software system, software development team roles • Section 2: SOFTWARE PRODUCTION PROCESSES, software process models, waterfall model, component-based model, spiral model, agile development methodology, RUP model • Section 3: PROJECT MANAGEMENT, project schedule, Risk management, project schedule, Gantt chart, critical path method. • Section 4: REQUIREMENT ENGINEERING, functional, non-functional requirements, deliverables, elicitation process • Section 5: UML, The UML language, use cases, use case diagram, detailed use case description. • Section 6: ARCHITECTURAL DESIGN, software application architecture, three-part architecture, component design • Section 7: UML - CLASS DIAGRAM, classes, relationships, relationship multiplicity • Section 8: UML- SEQUENCE DIAGRAM, classes, messages, semiology • Section 9: CODING - DESIGN PATTERNS, "Adapter", "Visitor", "Composite", "Bridge", "Unique" standards • Section 10: CODING, converting class diagram relationships to code • Section 11: TESTING, black and white box testing techniques, mtric code quality • Section 12: CASE TOOLS, versioning tools (git), testing tools (junit) • Section 13: COST ESTIMATE, COCOMO method, function points method, use case points method.

LEARNING OUTCOMES / GENERAL COMPETENCES	Students who successfully complete the course should be able to: • Analyze and design software systems with UML language. • Manage software projects, be able to estimate software costs and manage potential risks. • Implement large object-oriented systems. • Apply software testing techniques (white and black box testing). • Design software using software design patterns such as "adapter", "visitor", "composite", "observer" • Transfer the software design (class diagrams, sequence diagrams) consistently to verifiable and validable code. • Calculate basic software code metrics like Halstead, Mc Cabe metrics. • Know the basic software development models: waterfall, RUP, spiral model and agile models and be able to apply them in practice
PREREQUISITES	-
TEACHING METHODS	Lectures, exercises, practical examples in the lab
ASSESSMENT METHODS	The evaluation of students is carried out with: • Written evaluation • Semester Project- Development of a complex application (Tasks / Deliverable) The written evaluation is intended to examine the students' knowledge of the taught material and to capture the degree of its assimilation. Includes multiple choice questions, free questions but also short answers, evaluation of software development design problems. The development of a complex application (Semester Project) takes place in large groups of 5-6 people and includes the specification of requirements, the design, implementation and control of a large complex application in an object-oriented language. The work includes the following deliverables: 1. Project plan 2. Requirements Specification document 3. Software design document 4. Code 5. Testing results. The works are submitted electronically and are followed by an oral examination of the students. The final evaluation of the students is as follows: 60% Grade of Written Exam + 40% Semester project

LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	Books 1. S. Pfleeger, Software Engineering: Theory and Practice, Pearson. 2. I. Sommerville, Software Engineering, Pearson. 3. M. Fowler, UML Distilled: A Brief Guide to the Standard Object Modeling Language, Addison Wesley 4. M. Giakoumakis, N. Diamantidis, Software Engineering, Stamoulis Journals Information and Software Technology, Elsevier

VLSI DESIGN

COURSE UNIT CODE	E30
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	
TEACHING WEEKLY HOURS	4
INSTRUCTORS	
COURSE CONTENTS	NMOS and PMOS transistor properties. Transistors as switches. Physical design. Logic gates latency, modeling and design optimization. Energy consumption, power optimization techniques. Gate design using transistors. Combinational circuits. Pass transistor logic gates and dynamic gates. Sequential circuits and timing in digital circuits. Clock distribution. Memory design. Input/Output circuits, power distribution network on Integrated Circuit. Design automation methodologies. CAD Tools. CMOS design, static and dynamic CMOS logic structures. Integrated Circuit Floorplan and layout. VLSI simulation and verification. Laboratory exercises on circuit modeling, design and simulation at transistor level.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: • the VLSI design flow from the schematic up to fabrication on silicon. • the mathematical models of CMOS circuits simulation and analysis. • the CMOS design at transistor level. • the IC Design Rules and design rule checking. • the layout and floorplaning. • the usage of EDA/CAD tools for VLSI design, floorplan and mask preparation for fabrication. • the implementation tradeoffs and the selection of the best choices (trade-offs consumption) according to the design requirements. • the various optimizations realized on a transistor level. • the common pitfalls of CMOS design. • the design of regular VLSI structures (adders, multiplicators, ROMS, PLAs, SRAMs). • the clock skew and the noise problems and how to avoid it on a design.
PREREQUISITES	Knowledge from the following courses is required: • Digital Design, • Electronics I, II
TEACHING METHODS	Lectures, lab exercises.
ASSESSMENT METHODS	Written exam (50%), lab exam (50%).
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. CMOS Digital Integrated Circuits: Analysis and Design, KANG; LEBLEBICI, Εκδόσεις Επίκεντρο, 2014. 2. Σχεδιασμός Ψηφιακών Συστημάτων σε FPGAs, Wayne Wolf, ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ, 2013. 3. Ψηφιακα Ολοκληρωμενα Κυκλωματα: Μια Σχεδιαστικη Προσεγγιση, J. M. Rabaey, A. Chandrakasan, Κλειδαριθμος, 2006.

MECHATRONICS

COURSE UNIT CODE	EYH7
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY131/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	
COURSE CONTENTS	The course consists of the following sections: E01 Introduction to Mechatronics E02 Mechanical, electronic and computer parts of a mechatronic system. Systems interconnection. The concept of interface. E03 Electronic / digital systems in mechatronics. Sensors, inverters and actuators. E04 Electrical power management in mechatronic systems. E05 Automated control systems. Embedded systems and controllers. E06 PLCs in mechatronic systems; programming E07 Mechatronic system design: technologies, dynamic modeling, simulation, interconnection and system integration E08 Mechatronic system design: Identification and troubleshooting E09 Applications of mechatronics E10 Elements of Artificial Intelligence (AI) and its relation to mechatronics. In addition, the course will be accompanied by practical laboratory exercises so that the student can better understand the concepts developed in the theoretical part. These exercises will deal with practical applications in experimental setups and development of test structures, based on available infrastructure.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course the student will be able to • Understand the basic design principles, operation and limitations of mechatronic systems. • Recognize and understand the key parts (mechanical, electronic and computational) of a mechatronic system • Associate, categorize and analyze the subsystems of a mechatronic system and their respective operation • Draw a block diagram of a mechatronics system integrating functional and information links into it. • Understand, describe and analyze the control function of a mechatronic system. • Analyze common problems in the design and programming of a mechatronic system and suggests ways to address them.
PREREQUISITES	-
TEACHING METHODS	- Classroom teaching with video projector and tutorial exercises - Extensive use of the e-class platform
ASSESSMENT METHODS	• Written examination at the end of the semester (70%) • Practical experiments and lab exercises (30%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek-English
RECOMMENDED BIBLIOGRAPHY	1. Nesculescu D. “Μηχατρονική”, 2011, Εκδόσεις Τζιόλα 2. Auslander, David M. και Kempf, Carl J., “Μηχανοτρονική”, 1998, Πανεπιστημιακές Εκδόσεις Ε.Μ.Π. 3. W. Bolton. “Mechatronics: Electronic Control Systems”, 2003. 4. R. H. Bishop, “The mechatronics handbook”, 2002, CRC Press.

SCADA SYSTEMS

COURSE UNIT CODE	EYH3
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	
TEACHING WEEKLY HOURS	4
INSTRUCTORS	N/A
COURSE CONTENTS	• Brief introduction to SCADA systems • LabVIEW and Virtual Instruments. • Data collection: Measurement of single analog signal and multiple analog voltage signals. Measurement of single and multiple current signals, 4-20mA transmitters • Use of Instruments in Data reception (communication protocols RS-232, GPIB, Ethernet) • Receive and exchange data between remote modules connected via a TCP network using DataSocket technology. • Connection to industrial control devices (PLC) and transfer of data and information to user applications using OPC Server.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course the student will be able to: • create basic applications for downloading, transmitting and displaying them on HMI (Human - Machine Interfaces) screens using the LabVIEW graphical programming language, • know the connection techniques of analog sensors (0 - 10V) and transmitters (4 - 20 mA), • know the basic communication protocols with measuring instruments and be able to develop applications for receiving and processing measurements from instruments, • use the basic options of the Lab VIEW language as well as the capabilities of the http and TCP / IP communication protocols for the monitoring of remote units of measurement and control, • can record and control the parameters of industrial PLC devices using OPC Server.
PREREQUISITES	-
TEACHING METHODS	Lectures, Lab exercises

ASSESSMENT METHODS	Individual assignment (50%) Final exams (50%)
LANGUAGE OF INSTRUCTION / EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. "Industrial automation with SCADA – Concepts, communication, and security", K.S. Manoj, Notionpress.com 2. Καλοβρέκτης Κωνσταντίνος, «LabVIEW για μηχανικούς», 3η έκδ./2013, ISBN: 978-960-418-448-4, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ.

EMBEDDED SYSTEMS

COURSE UNIT CODE	E33
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE192/ http://arch.icte.uowm.gr/courses/embedded/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Dasygenis M.
COURSE CONTENTS	Embedded Computing Principles. CPU instruction sets. Design, development and programming of digital embedded systems. Design requirements. Software and hardware analysis of typical embedded problems. Memory Hierarchy. Algorithmic transformations. Software and hardware application development. Real Time Operating Systems. Integration levels (vlsi, fpga, asic, asip). System Modeling using VHDL and UML. Performance and Power consumption optimization. Peripherals and interconnections. Embedded multiprocessor and accelerators. Input/Output Mechanisms. Interrupts. Exceptions. ARM Architecture. Laboratory assignments in assembly language programming and C for popular embedded processors and micro-controllers and VHDL

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to demonstrate knowledge and understanding of: •the embedded systems and their specific requirements, •the economics of the embedded system design, •the interconnection networks, •the hardware software codesign, •the hardware accelerators, •the popular embedded systems architecture and organization, •the real time operating systems, •the hard and soft deadlines, •the performance of the embedded systems, •the input/output mechanisms, •the fundamental peripherals of an embedded system. From the laboratory assignments, students will gain the abilities to: •create and program embedded systems, according to the design requirements, •program micro-controllers and peripherals (arduino & shields), •understand the flexibility of the FPGA and utilize it in projects of embedded systems, •create and optimize applications in terms of low power consumption and high performance, •familiarize themselves with the ARM and TI integrated development environments, •fully utilize the VHDL to describe modules of embedded systems, •use the FPGA for application development, •design an embedded system using soft-cores, •design a system-on-chip (SoC), •master the DTSE methodology for application optimization, •use and glue together multiple intellectual property cores, •co-design hardware (VHDL) and software (C).
PREREQUISITES	Operating Systems (not compulsory), Computer Architecture (not compulsory)
TEACHING METHODS	Lectures, PowerPoint slides, Lecture Notes, in class quizzes, e-class, automated examination system i-exams, open courses video lectures, laboratory exercises, semester group project.

ASSESSMENT METHODS	The final grade is the sum of the laboratory grade and theory grade. The Maximum for these grades is 5, totaling both in 10. The students have to pass the Laboratory (at least 3/6) and Theory (at least 2/4), and also be present at the 85% of the laboratory sessions. Theory Examination (max 4 grades) • Multiple Choice Questions Examination – 4 Lab Examination (max 6 grades)
LANGUAGE OF INSTRUCTION/ EXAMS	-
RECOMMENDED BIBLIOGRAPHY	1. Σχεδιασμός ενσωματωμένων συστημάτων, Σούντρης, Δημήτριος, Δασυγένης, Μηνάς 2. Ενσωματωμενα Συστηματα, Μηνας Δασυγενης, Δ. Σουντρης

DIGITAL GAMES DEVELOPOMENT

COURSE UNIT CODE	E43
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE336/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Protopsaltis A.
COURSE CONTENTS	Main goal is to create and develop digital games: modeling, animation and photorealistic rendering through a step-by-step programming process focusing on • the visual style, • the knowledge of the suite of visual development tools and • the reusable software elements, Additionally, the evaluation of points and symbols through • the artistic creation (narrative design, visualization, images, sounds, scenarios, evolution of the story, journey of the hero, imaginary dimension).

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course the students will be able to: • design a digital Game Architecture, by analyzing the game requirements, constructing game structures, and distributing data to game structures • use the Unity engine as a development environment and game creation framework, emphasizing on its features, understanding its internal structure, the utilizing 2D and 3D components and cameras, inserting objects (characters, 3D models, sound, etc.), adding 2D and 3D physics to the object space. • create 2D and 3D models, using design or composition techniques, textures, animation, and photorealistic rendering. • use of Unreal engine as a development environment and game creation framework, emphasizing on its features, understanding its internal structure, inserting 2D and 3D characters, designing the virtual environment, adding sound, applying physics properties within the game environment.
PREREQUISITES	Knowledge required: Structured Programming, Object Oriented Programming, Algorithms and Data Structures, Computer Graphics
TEACHING METHODS	Face-to-face Laboratory exercises Use of eclass for the submission of assignments/projects/exams, as a repository of educational material, as medium for online conversations/questions. Use of laboratory computers with special software for programming: Unity3D, Python, graphics/model editing etc.
ASSESSMENT METHODS	Computerized Theory Assessment (50%) Semester Project (50%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Birn, J. (2000). *Digital Lighting and Rendering*. USA: Library of Congress. 2. Boellstorff, T. (2010). Coming of Age in Second Life: An Anthropologist Explores the Virtually Human. Princeton. Press. 3. Fuller, M. (ed.) (2008). *Software Studies: A Lexicon*. Cambridge, Massachusets: The MIT Press 4. Luebke, D. (2003). *Level of Detail for 3D graphics*. USA: Morgan Kaufmann Publishers. 5. Meigs, T. (2003). *Ultimate Game Design: Building Game Worlds*. McCraw-lHill/Osborne Companies.

ADVANCED DATABASES

COURSE UNIT CODE	E40
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE206/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Michalas A.
COURSE CONTENTS	The course outline covers the following topics: • Object Oriented Databases, Parallel and Distributed Databases • Internet Databases, Databases for semi-structured data • Introduction to Database for Big Data • Introduction to document-oriented Databases and big table Databases. Learning MongoDB and the Apache Cassandra Database. • Design and development of Database applications • Introduction to Spatial-temporal Databases. Case study and implementation of an application with a space-time Database. Introduction to Inductive and Multimedia Databases. • Transactions, synchronization control, data recovery. • Fragmentation functions, dynamic fragmentation, expansive fragmentation, exponential list constraint fragmentation, linear fragmentation. • Query optimization, algebraic transformations, heuristic optimization, operation implementation and cost estimation, result extraction.

LEARNING OUTCOMES / GENERAL COMPETENCES	On successful completion of this module the student will be able to: 1. Understand the methods used by database systems to support their functions. 2. Understand the complex functions performed in relational database systems 3. Understand and describe the distributed, parallel and object-oriented DB. 4. Understand how document databases and NoSQL databases work 5. Design-implement applications interconnected with DB, to improve their performance and to manage transactions. 6. Design advanced types of queries and applications to support temporal, spatial, geographical and multimedia data.
PREREQUISITES	-
TEACHING METHODS	• Theoretical treatment in class, aided by active discussion and participation of students. • Teaching material is presented by Power-Point presentations. • Laboratory exercises are provided for understanding the course material. • Provisioning of Online learning resources
ASSESSMENT METHODS	Final examination weighted at 60%, examination of laboratory exercises weighted at 20% and examination of the course assignment weighted at 20%. 1. The final exam includes: - Multiple choice questions. - Problem solving by applying the acquired knowledge. - Comparative evaluation of theoretical issues. 2. The examination of the laboratory exercises includes the evaluation of the laboratory skills acquired using DB and software platforms. 3. The examination of the course assignment includes the evaluation of a DB application implemented by the student.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Database System Concepts, Abraham Silberschatz, Henry F. Korth,S. Sudarshan, 6th Edition- McGraw-Hill. 2. Fundamentals of Database Systems, Elmasri Ramez, Navathe Shamkant B, 6th Edition- Pearson. 3. Database Management Systems, Ramakrishnan Raghu, Gehrke Joahannes, 3rd Edition - McGraw-Hill. 4. H. Garcia-Molina, J.D. Ullman, J.D. Widom, "Database Systems: The Complete Book", Prentice Hall-2001. 5. C.J. Date, Introduction to Database Systems, Addison Wesley-2003.

HUMAN-COMPUTER INTERACTION

COURSE UNIT CODE	Y7-H
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE314/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Protopsaltis A.
COURSE CONTENTS	Human perception, Attention, Human Processor Model, GOMS, Fitts Law, Hick Hyman Law, Keystroke-level model, Cognitive Architectures, Mental models, Interactive technologies, Input/Output devices, Styles of interaction, Interactive Systems Design methodologies, Evaluation of interactive systems, Natural interfaces, Haptic interaction methodologies, Introduction to Virtual/Augmented/Mixed Reality Laboratory exercises on design and evaluation of interactive systems with the use of analytical, experimental and exploratory methods
LEARNING OUTCOMES / GENERAL COMPETENCES	Students will be able to understand theoretical models of human-machine interaction, make use of technologies, methods and tools for the design and development of interactive software systems. Based on human interaction models they will be able to evaluate interactive systems.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Laboratory exercises • Possibility of remote courses

ASSESSMENT METHODS	• Language of evaluation: Greek/English • Formative assessment • Multiple choice tests • Short-answer questions • Problem solving • Laboratory work • Oral exam
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Dix Alan J., Finlay Janet E., Abowd Gregory D., Επικοινωνία Ανθρώπου-Υπολογιστή, Χ. Γκιουρδα, 3η έκδοση 2007. 2. Αβούρης Ν., Κατσάνος Χ., Τσέλιος Ν., Εισαγωγή στην Αλληλεπίδραση Ανθρώπου Υπολογιστή, Πανεπιστήμιο Πάτρας 2016 3. Shneiderman Ben, Plaisant Cathrerine, Σχεδίαση Διεπαφής Χρήστη, Α. Τζιόλα, 6η έκδοση 2016.

Machnie Learning

COURSE UNIT CODE	EYH6
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE393/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Fragulis G.
COURSE CONTENTS	Introduction to Machine Learning. Linear Models. Tree Models. Rule Models. Model Ensembles. Reinforcement Learning. CNN, GAN DEEP LEARNING
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, students will know what is involved in the field of engineering learning, as well as how algorithms for linear models, tree models, rule models, ensembles of models and reinforcement learning work. In addition, they will be able to apply such algorithms to real-world data and applications using Python's scikit-learn and gym libraries. Retrieve, analyse and synthesise data and information, with the use of necessary technologies . Adapt to new situations. Make decisions. Work autonomously. Work in teams. Work in an international context. Appreciate diversity and multiculturality. Respect natural environment Be critical and self-critical. Advance free, creative and causative thinking. Retrieve, analyse and synthesise data and information, with the use of necessary technologies. Advance free, creative and causative thinking.
PREREQUISITES	-
TEACHING METHODS	Lectures using PowerPoint slides, Distance Learning using e-class platform.

ASSESSMENT METHODS	Written final examination (80%): - Multiple-choice questions - Short Answers - Laboratory Work Atomic / group project work (20%)
LANGUAGE OF INSTRUCTION / EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Αναγνωριση Προτυπων Και Μηχανικη Μαθηση, C.M. Bishop, Έκδοση: 1/2019. 2. Μηχανικη Μαθηση, Κωνσταντινος Διαμανταρας, Δημητρης Μποτσης, Έκδοση: 1η/2019. 3. Νευρωνικά Δίκτυα και Μηχανική Μάθηση, Haykin Simon, Έκδοση: 3η έκδ./2010. 4. Αναγνώριση Προτύπων, Theodoridis S. , Έκδοση: 1η έκδ./2011.

Geographic Information Systems

COURSE UNIT CODE	E44
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE337/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	
COURSE CONTENTS	G.I.S. can be applied to spatial dynamics using and analyzing Geographical Information of Databases, Digital Cartography and Visualization of spatial data. The principal course target is to acquire theoretical knowledge of G.I.S. in a way to understand possibilities and restrictions of G.I.S. software. Course Parts: 1.Basic concepts of G.I.S. Vector (Point, Line, Polygon) and Raster data. 2.Introduction to free G.I.S. software. Spatial data insertion (Vector, Ruster). 3.Introduction to cartography and mapping in a G.I.S.: map creation in different scales, basic concepts: thematic map, scale, projections and coordinate systems. 4.Georeference in G.I.S. Georeference of Raster data. 5.Digitize in a G.I.S. New layer creation using QGIS freeware with thematic map Raster data support. 6.Geodata bases. 7.Analytic spatial processes: select by location, select by attributes. 8.Proximity Analysis with buffer zones. 9. Map overlay. 10.Digital Elevation Model (D.E.M.) 11. 3D applications. 12.Spatial Analysis and G.I.S. 13.Course overview. Preparation for the final exam.

LEARNING OUTCOMES / GENERAL COMPETENCES	General knowledge, principles and processes of Geographical Information Systems (G.I.S.). The course introduces the potential to import, create, manage, update and correct Geographical databases. With course completion the student will be able to: -Create Vector Geographical Data of high spatial precision. -Compare and evaluate existing Geographical Data. -Analyze and adapt Geographical Data according to concrete prescription and need. -Organize and add value to Geographical Data transforming them to Geographical Information. -Combine Geographical Data with external Databases. -Transform Geographical Coordinates from one Georeference System to another. In general, with course completion, students will be able to apply G.I.S. in different domains (urban and natural environment, civil and military uses, national and international cooperation's).
PREREQUISITES	-
TEACHING METHODS	In real time, face to face.
ASSESSMENT METHODS	70% Final Theory Exams, 30% Semester Assignment.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Burrough. P.A. & R., A. McDonnell (1998): Principles of geographical information systems. Oxford Uniω. Press, Oxford. [2] Ian Heywood, Sarah Cornelius, Steve Carver: An Introduction to Geographical Information Systems, 4th Edition, Kindle Edition 2. Καλογήρου, Σ., 2015. Χωρική ανάλυση. [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. 3. Τσούλος, Λ., Σκοπελίτη, Α., Στάμου, Λ. 2015. Χαρτογραφική σύνθεση και απόδοση σε ψηφιακό περιβάλλον. [ηλεκτρ. βιβλ.] 4. Φαρασλής Ι. Πανεπιστήμιο Θεσσαλίας, Πολυτεχνική Σχολή ΤΜΧΠΠΑ, 2012. Σημειώσεις: Γεωγραφικά Συστήματα Πληροφοριών και χαρτογράφηση φυσικών πόρων - Recommended Article/Paper Resources: 5. International Journal of Geographical Information Science 6. https://www.tandfonline.com/toc/tgis20/current

CONSTRAINT PROGRAMMING

COURSE UNIT CODE	EHY9
COURSE UNIT TYPE	specialization
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE394/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Stergiou K.
COURSE CONTENTS	• Constraint Satisfaction Problems (CSPs) • binary and non-binary constraints, • problem modeling, • local and global consistency, arc consistency, basic arc consistency algorithms, • solving CSPs by backtracking, • forward checking algorithm, • maintaining arc consistency algorithm, • local search, • key characteristics of constraint solvers, • global constraints, • programming constraint solvers, • optimization problems, case studies of real combinatorial problems.

LEARNING OUTCOMES / GENERAL COMPETENCES	The expected learning outcomes are the following: 1. Understanding basic concepts of constraint satisfaction problems and constraint programming. 2. Understanding methods of solving constraint satisfaction problems. 3. Gain experience in programming constraint solvers. 4. Development of creative thinking. 5. Development of problem-solving skills. 6. Gain experience in collaborative management and problem solving. Upon successful completion of the course, students will: 1. understand the basics of constraint programming 2. know how to implement key algorithms for solving constraint satisfaction problems 3. have gained experience in programming constraint solvers 4. have gained experience in the use of constraint programming to solve real combinatorial problems
PREREQUISITES	-
TEACHING METHODS	Face to face
ASSESSMENT METHODS	The evaluation is done through: 1. written examination at the end of the semester that includes short answer questions and resolution of exercises 2. scoring the report and the code of the projects carried out during the semester 3. oral presentation of the projects carried out during the semester The evaluation criteria are as follows: • correctness • clarity • accuracy • efficiency
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: Russell & Norvig, Artificial Intelligence: A Modern Approach, 2004 - Recommended Article/Paper Resources: Constraints, Artificial Intelligence, Journal of Artificial Intelligence Research, Annals of Mathematics and Artificial Intelligence

9TH SEMESTER – DIVISION OF COMPUTERS & ELECTRONICS

DESIGN AND OPERATION OF COMPUTER NETWORKS

COURSE UNIT CODE	YH2
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	www.eclass.uowm.gr/courses/ICTE279/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Lazaridis V.
COURSE CONTENTS	Network Management. Network Security. Quality of Service (Int-Serv, DiffServ). Multimedia Services and Networking. Introduction to application protocols. E-mail. FTP. Domain Name System (DNS). Peer Networks, Content Delivery Networks (CDNs). The World Wide Web, SOCKET programming. Implementation of communication protocols. Usage of simulation packages.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will be able to: • understand modern techniques, protocols, and applications across the area of computer networks. • investigate, analyze, and document the core issues and requirements in building effective computer networks. • adapt their knowledge to new and emerging technologies, such as MPLS, cloud computing, as well as modern Internet technologies such as IPv6, Internet of Things, etc., based on a solid understanding of the underpinning principles.
PREREQUISITES	-
TEACHING METHODS	Lectures, laboratory sessions
ASSESSMENT METHODS	Written exam (70%) Laboratory exam (30%)
LANGUAGE OF INSTRUCTION / EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Andrew S. Tanenbaum, *Δίκτυα Υπολογιστών*, 4η έκδοση, Εκδόσεις Κλειδάριθμος. 2. William Stallings, *Επικοινωνίες Υπολογιστών και Δεδομένων*, 6η έκδοση, Εκδόσεις Τζιόλα. 3. Douglas Comer, *Διαδίκτυα και Δίκτυα Υπολογιστών*, 4η έκδοση, Εκδόσεις Κλειδάριθμος. 4. Douglas Comer, *Διαδίκτυα με TCP/IP (Α Τόμος)*, 4η έκδοση, Εκδόσεις Κλειδάριθμος. 5. Jean Walrand, *Δίκτυα Επικοινωνιών*, Εκδόσεις Παπασωτηρίου.

WEB PROGRAMMING

COURSE UNIT CODE	MK35
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE315/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Lazaridis V.
COURSE CONTENTS	XHTML documents, Text Formatting, Images, Links, Forms, Cascade Style Sheets, Document Object Model, Server-side scripting (PHP), Variables, Functions, Tables, Databases, Client-side scripting (Java-Script), Objects, Events, Asynchronous Programming (AJAX). Website Security.
LEARNING OUTCOMES / GENERAL COMPETENCES	The course focuses on web technologies, with emphasis on web systems and applications programming. Initially, students review the technologies in the fields of computer networks, internet, world-wide-web, web-browsers, and webservers. Students are introduced to full stack development. They become familiar with the development of both static web pages, using HTML and CSS scripting, and dynamic web pages and web applications using server-side scripting with PHP, and MySQL databases, secure PHP scripting, client-side scripting with Javascript, and asynchronous data exchange AJAX, XML, and JSON. Students will be able to develop full stack web applications.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Laboratory exercises • Possibility of remote courses

ASSESSMENT METHODS	• Language of evaluation: Greek/English • Formative assessment • Multiple choice tests • Short-answer questions • Laboratory work • Oral exam
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Karakos A., Programming Static and Dynamic Webpages, Publisher A. Tziola, 3rd Edition /2016. 2. Kenterlis P., Development of Web Applications, Theory and Practice, P. Kenterlis/2009 3. Welling Luke, Thomson Laura, Development of Web Applications with PHP and MySQL, 4th Edition, X. Giourda et all, 2011.

Advanced Topics Of Digital Design

COURSE UNIT CODE	E23
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE378
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Asimopoulos N.
COURSE CONTENTS	• Hardware description languages. The VHDL language, levels of behavior and structure. Design of advanced combinatorial and sequential digital circuits using the VHDL language. • Design of memories, processors. Logical and temporal simulation. • Synthesis. Programming of reprogrammable devices (FPGAs - CPLDs). Use of ready-made cores (IP cores), systems on a chip (SoC). • Programming of embedded cores. VHDL material description language for SoC design. • Laboratory exercises in VHDL, programming and

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, students gain knowledge and understanding of the following topics: • the importance of using hardware description languages (HDLs), • increasing productivity with HDLs, • the design workflow in reprogrammable logical structures, • the proper use of the VHDL language in digital design, • programming internal processor cores in an FPGA, • modern applications of Hardware Description languages. Upon successful completion of the laboratory department of the course, students gain knowledge and understanding of the following issues: • advantages of VHDL language over schematic description, • writing and debugging in VHDL language, • correct use of all VHDL commands, • logical simulation of digital circuits, • synthesis in FPGAs and CPLDs, • estimation of time delays in digital circuits, • transferring the design to FPGAs and CPLDs, • communicating with the reprogrammable devices. •
PREREQUISITES	Digital Design
TEACHING METHODS	In class lectures and laboratory exercises Possibility of distance learning
ASSESSMENT METHODS	Laboratory Exercises 50% Final Examination 50%
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Peter J Ashenden, Ψηφιακή Σχεδίαση με VHDL, Έκδοση: 1η/2010, ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΜΟΝ. ΕΠΕ ISBN: 978-960-6759-505, Κωδικός Βιβλίου στον Εύδοξο: 64314 2. VOLNEI A. PEDRONI, Σχεδιασμός κυκλωμάτων με τη VHDL,Έκδοση: 1η/2008, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, ISBN: 978-960-461-118-8, Κωδικός Βιβλίου στον Εύδοξο: 13901. 3. Brown, Vranesic , Σχεδίαση Ψηφιακών Συστημάτων με τη Γλώσσα VHDL, Έκδοση: 3η Έκδοση/2011, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., ISBN: 978-960-418-340-1, Κωδ Βιβλίου Εύδοξο:

MICROTECHNOLOGY AND NANOTECHNOLOGY

COURSE UNIT CODE	E5
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE335/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	
COURSE CONTENTS	• Introduction to Microtechnology and Nanotechnology. • Historical background of micro- and nano-scale. • Machinery, tools and implements used in nanoscience. • Fabrication technology for Integrated Circuits and high-quality clean room processes. • Advanced microtechnology and nanotechnology applications (Biology, Medicine, BioMEMS, Space, Environment, Communications, Electronics and Sensors, Energy and Materials). • Examples of Nanoelectronics applications and recent research advances, such as organic electronics, graphene. • Nanotechnology legislation (Nanotoxicity/ Public Policy). • Future nanotechnology prospects and applications.

LEARNING OUTCOMES / GENERAL COMPETENCES	Students acquire a set of thorough knowledge upon the fundamentals and the main applications of microtechnology and nanotechnology. Students become familiar with the terms, the concepts and the basic tools used in contemporary development and fabrication processes of relevant products and research efforts in the field of nanoscience / nanotechnology for engineering applications. The description of several findings could modify students' understanding on the operating mode of micro-nanoscale and lead them to focus their own creative energy on facing important challenges in the field of engineering by comprehending and giving answers to existing questions. The students acquire a theoretical background that is useful for their future post-graduate studies.
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Possibility of synchronous distance learning
ASSESSMENT METHODS	• Presentation (20-25 slides) and written essay (2500 words) of three essays with different content. • Final course grade (100%): Final written theory examination = 40% and Final essays grade (average grade) = 60%
LANGUAGE OF INSTRUCTION/ EXAMS	Greek and English
RECOMMENDED BIBLIOGRAPHY	1. Hanson George W., Fundamentals of Nanoelectronics, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2009. 2. Williams Linda and Adams Wade, Nanotechnology Demystified, Εκδόσεις Επίκεντρο, 2006. 3. Παπασπυρίδης Κ, Παυλίδου Σ, Νανοτεχνολογία και προηγμένα πολυμερικά υλικά, ΑΡΗΣ ΣΥΜΕΩΝ, 2012. 4. Jeremy Rasden, Nanotechnology: An Introduction, Published by Elsevier Inc., 2011.

FUZZY SYSTEMS

COURSE UNIT CODE	ΕΥΗ4
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE388/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Fragulis G.
COURSE CONTENTS	Fuzzy Systems: Fuzzy sets, properties, fuzzy operators and membership functions. Resolution and extension theorems, a-cuts, fuzzy union, intersection and complement. Fuzzy relations, operations between fuzzy relations, fuzzy relation composition, fuzzy set-relation composition. Fuzzy If/Then rules and implication functions. Fuzzy rule bases, compositional rule of inference, fuzzification and defuzzications structures. Fuzzy controllers, controller structures. Design of fuzzy controllers FZ-PI, FZ-PD and FZ-PID. Comparative gain tuning, experimental results of fuzzy controllers. Fuzzy TSK models and models with crisp outputs. Training algorithms for adaptive neuro-fuzzy networks. Fuzzy clustering algorithms, the Fuzzy C-means method. Neural Networks (NNs): Perceptron model and learning rules. Supervised, unsupervised and reinforcement learning techniques. Single layer and multi-layer networks. The back-propagation algorithm. RBF networks and equivalence to fuzzy systems. Self-organizing networks SOFM. The learning vector quantization (LVQ) algorithm. Applications of NNs to prediction and control tasks. Integration between fuzzy and NN systems, neuron-fuzzy models.

LEARNING OUTCOMES / GENERAL COMPETENCES	1. Comprehending the principles underlying the various processes involved in fuzzy systems: linguistic descriptions, fuzzy IF/THEN rules, rules of inference. 2. For a given problem the student should be able to formulate a suitable fuzzy rule base, select the implication operators, the fuzzification and the de-fuzzification strategies. 3. In regard to control tasks, the student should be able to develop the proper controller structure, formulate its fuzzy rule base and select suitable gain parameters for optimal system's response. 4. In regard to fuzzy modeling for prediction tasks, design the appropriate fuzzy model and implement the parameters learning algorithm. 5. Comprehending the principles of fuzzy clustering and deal with applications to data classification. 6. Understanding the principle, structures and learning techniques involved in NNs. 7. Examining NNs of various structures, the relevant training techniques, and their applications to control, modeling and classification problems. 8. Integration of fuzzy systems and neural network models.
PREREQUISITES	-
TEACHING METHODS	• Lectures using PowerPoint slides, Distance Learning using e-class platform.
ASSESSMENT METHODS	Written final examination (80%): - Multiple-choice questions - Short Answers - Laboratory Work Atomic / group project work (20%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Ευφυής έλεγχος, Κινγκ Ρ. 2. Εισαγωγή στην ασαφή λογική (Fuzzy Logic), Θεοδώρου Γιάννης Α. 3. ΑΣΑΦΗ ΣΥΝΟΛΑ, ΠΑΠΑΔΟΠΟΥΛΟΣ ΒΑΣΙΛΗΣ, ΜΠΟΤΖΩΡΗΣ ΓΕ-ΩΡΓΙΟΣ

COMPILERS

COURSE UNIT CODE	MK39
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE345/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Bibi S.

COURSE CONTENTS	Introduction to programming phases, Dictionary structure of programming languages, Lexical analysis, Regular expressions, Deterministic finite automata, Code generators, Syntax of programming languages, Syntax analysis: top-down and bottom-up analysis, Symbol table, Semantic analysis, Grammar of semantic properties and symbol table, Code generation-synthesis: intermediate code and machine code, Data display in memory. Course modules: • Section 1: Introduction to Compilers, Basic Compilation Phases, Types of Programming Languages, Compiler Technologies, Translators, Pre-Processors, Interpreters, Figure T • Section 2: Lexical Analysis, Basic Definitions, Regular Expressions, Flex Tool • Section 3: Lexical analysis, Deterministic Finite automata • Section 4: Syntax analysis, Grammar, Top- down analysis, LL (1) parser, First-Follow sets, parsing table • Section 5: Syntax Analysis, Bottom-up Analysis, LR parser, Closure sets, goto and action tables • Section 6: Syntax Analysis, right, left sentence generation, BYACC tool • Section 7: Semantic analysis, grammar of properties • Section 8: Semantic analysis, translation scheme, symbol table. • Section 9: Intermediate Representation, Graphic Representations, Decorated Trees, tuples, stacks • Section 10: Intermediate representation, 3-address code • Section 11: Code Optimization • Section 12: Generating Machine Code • Section 13: Display of data types and structures
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon the successful completion of the course students are expected to: Be able to compare the characteristics of programming languages through a critical approach Understand conflicting programming language design options and how several choices affect the language acceptance Understand the trends in the use of programming and be prepared for new programming methods, templates and tools Familiarize with the whole programming language design cycle Gain compiler implementation experience

PREREQUISITES	-
TEACHING METHODS	Face to Face
ASSESSMENT METHODS	The evaluation of students is carried out with: • Written evaluation • Progress exam • Team work The written evaluation is intended to examine the students' knowledge of the taught material and to capture the degree of its assimilation. Includes multiple choice questions, free questions but also short answers. The written progress exam aims to establish the degree of familiarity of students with the subject of the course in the middle of the semester. The team work is done in groups of 2 people and includes the development of a compiler section for a specific language, the grammar of which is given in. The first work concerns lexical and syntactic analysis while the next concerns semantic analysis. The final evaluation of the students is as follows: 70% Written examination grade + 20% Progress grade + 10% Team Work
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	Books (in Greek) 1. Papaspyrou N., Skordalakis E., Compilers, S.ATHANASOPOULOS. 2. ML Scott, Programming Language Pragmatics, Morgan Kaufmann 3. JC Mitchell, Concepts in Programming Languages, Cambridge University Press 4. AV Aho, MS Lam, R. Sethi, JD Ullman, Compilers: Principles, Techniques, and Tools, Addison Wesley 5. Katsaros P., MakrisG., Tebekeridis A., Programming Languages and Compilers, Zigos. Journals: 6. Computer Languages, Systems and Structures, Elsevier

DATA MINING

COURSE UNIT CODE	E11
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE293/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Tsipouras M.
COURSE CONTENTS	• Definition, Reasons for Data Mining, Data Mining Process, Databases & Data Warehouses, Data Pre-processing, Data Mining Techniques & Methods. • Data, Values & data types, Data properties, Types of data sets – data quality. • Data pre-processing, Data Summary, Data Purification and Transformation, Quantumization, Sampling, Dimension Reduction, Similarity – Data Distance. • Similarity & Dissimilarity of Data, Types of similarity / dissimilarity, Distance. • Similarity Operators, Correlation, Density. • Data Warehouses, Data Mining Process, Databases, Shape, Content. • Grouping, defining a group – grouping, K – means Algorithm, Properties, Training. • Sorting, K – nearest neighbors' algorithm, Properties, Education. • Perceptron, Definition, Artificial Neuron, Linearly Detachable Problem, Properties, Training, Training Algorithm. • Multilayer perceptron, Definition, Architecture, Properties, Global Convergence, Training, Backpropagation, Training Algorithm. • Decision Trees, Introduction, Definition, Induction Algorithm, Separating Properties, Termination Criteria, Truncation. • Correlation Rules, Frequent Itemsets, Correlation Mining Rules, Frequent Itemsets Calculation, Apriori Algorithm, Complexity Factors.

LEARNING OUTCOMES / GENERAL COMPETENCES	The course is the main introductory course in the concepts of Data Mining. The course aims to introduce students to the basic Data Mining Techniques (data, problems, applications). It also refers to introductory concepts of Data Pre-processing, Sorting, Clustering and Correlation Rules, so that the student has a comprehensive understanding of the procedures and methodologies used in Data Mining. In this sense the course is the basis on which specific methodologies and data mining techniques are developed and can be used at postgraduate level. Finally, the aim of the course is for students to understand the importance of data mining in multiple applications as well as its contribution to different scientific fields. Upon successful completion of this course, students will be able: • describe the basic principles of D. M. – recognize different approaches to data mining (Unsupervised Learning, Supervised Learning). • identify and select data preprocessing techniques. • distinguish concepts of sorting, categorization, and clustering of data. • discover knowledge through large data warehouses. • design and develop grouping and sorting algorithms. • compose correlation rules. • reconstruct multidimensional data mining problems using dimensional techniques. • evaluate and compare D. M. algorithms and judge accordingly their suitability for specific problems.
PREREQUISITES	-
TEACHING METHODS	Face to face Distance learning
ASSESSMENT METHODS	Assignment (40% of the total mark) and exams (60% of the total mark)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Michael Vazirgiannis, Chalkidi Maria, Mining knowledge from databases and the web, G. DARDANOS - DARDANOS K., 2005. 2. Tan Pang - Ning, Steinbach Michael, Kumar Vipin, Introduction to data mining, A. Tziola & Sons PUBLICATIONS, 2010. 3. Margaret H. Dunham, DATA MINING, NEW TECHNOLOGIES PUBLICATIONS Ltd., 2004.

BIOINFORMATICS

COURSE UNIT CODE	Y9
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE162/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Aggelidis P.
COURSE CONTENTS	Introduction to the basic concepts of biology. Biological DNA and RNA macromolecules. Protein building blocks. Biological databases. Replacement tables. Dynamic programming algorithms. Align sequences in pairs. Multiple sequence alignment. Patterns and patterns in biological macromolecule sequences. Basic principles of development. Phylogenetic analysis. Construction of phylogenetic trees with the algorithms UPMGA, Fitch-Margoliash & Neighbor-joining. DNA microarrays. The heuristic algorithms FASTA & BLAST.
LEARNING OUTCOMES / GENERAL COMPETENCES	The goal of Bioinformatics is the application of computer technology in the management and analysis of biological data. In particular, the aim of the course is for students to deal with the calculation, storage, analysis, graphic representation, simulation / modeling of biological information.
PREREQUISITES	-
TEACHING METHODS	Lectures Labs Remote
ASSESSMENT METHODS	60% final exam 20% lab test 20% homework
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. PANTELIS ANGELIDIS, Medical Informatics volume A, "wisdom", 2011. 2. Athena Lazakidou, Advanced IT Systems and Services in the Field of Health, ATHENS LAZAKIDOU, 2009.

DIGITAL IMAGE PROCESSING

COURSE UNIT CODE	E17
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	http://eclass.uowm.gr/courses/ICTE338/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Tsalikakis D.
COURSE CONTENTS	Introduction to the image, Binary images. Color Models, Binary Algorithms, Image Rotation, Transformations, Two-Dimensional Transformations: Walsh, Hadamard, Haar. Image Optimization: Noise in Images, Medium Value, Medium Value Filters, Gaussian Filters, High-pass Filters, Histogram Equalization Techniques. Image Segmentation. Determining contours and image boundaries. Fourier Transformation. Hough Transformation. Feature extraction. Edge detection: Kirsch method, Laplace operator, Marr and Hildreth method. Matlab applications.

LEARNING OUTCOMES / GENERAL COMPETENCES	This course provides an introduction to the applied digital image processing technology through a practical approach. The aim of the course is to cover topics that include: The mathematical foundations of image analysis. The theory and applications of transformations in two dimensions. The design and applications of digital filters. The theory and applications of image restoration and encoding. More advanced applications such as decomposition, waves (wavelets), etc will be covered. Special emphasis will be given to the processing of Digital Medical Image. Through MATLAB basic programming instruction, the student will be given the opportunity to encounter real problems in the field of medical image and see advanced filtering and object detection techniques in medical image. Upon completion of the course, the student will have acquired the necessary knowledge and skills to be able to understand basic principles related to the representation and manipulation of medical digital images, to understand the methods of image processing in both space and frequency domain and finally to understand basic algorithms for restoring medical images.
PREREQUISITES	-
TEACHING METHODS	In-person (and potentially online through a synchronous distance learning platform)
ASSESSMENT METHODS	I. Final theory examination (50%) II. Final lab examination (50%) III. Project (bonus)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Suggested Bibliography: 1. Παπαμάρκος Νικόλαος, Ψηφιακή Επεξεργασία και Ανάλυση Εικόνας, ΝΙΚΟΛΑΟΣ ΠΑΠΑΜΑΡΚΟΥ, 2010. 2. ΙΩΑΝΝΗΣ ΠΗΤΑΣ, ΨΗΦΙΑΚΗ ΕΠΕΞΕΡΓΑΣΙΑ ΕΙΚΟΝΑΣ, ΙΩΑΝΝΗΣ ΠΗΤΑΣ, 2010. 3. Gonzales, Ψηφιακή Επεξεργασία Εικόνας, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ, 2010. - Related scientific articles: [1] Tsalikakis, D. G., Karvelis, P. S., & Fotiadis, D. I. (2009). Segmentation of Cardiac Magnetic Resonance Images. In Handbook of Research on Advanced Techniques in Diagnostic Imaging and Biomedical Applications (pp. 108-125). IGI Global. [2] Tsouros, D. C., Smyrlis, P. N., Tsalikakis, D. G., Giannakeas, N., Tzallas, A. T., Manousou, P., & Tsipouras, M. G. (2020). A novel classification via clustering algorithm for fibrosis assessment in liver biopsies. Health and Technology, 1-9. [3] Litjens, G., Kooi, T., Bejnordi, B. E., Setio, A. A. A., Ciompi, F., Ghafoorian, M., ... & Sánchez, C. I. (2017). A survey on deep learning in medical image analysis. Medical image analysis, 42, 60-88. [4] Christopoulos, C., Skodras, A., & Ebrahimi, T. (2000). The JPEG2000 still image coding system: an overview. IEEE transactions on consumer electronics, 46(4), 1103-1127.

COMPLEXITY THEORY

COURSE UNIT CODE	E10
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE266/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Ploskas N.
COURSE CONTENTS	• Problems, Algorithms and Computational Complexity. • Turing Machines. • Recursive and Recursively Enumerable Languages. • Special Types and Combinations of Turing Machines. • Non-deterministic Turing Machines. • Global Turing machines. • Church Thesis. • Undecidability. • The Halting Problem. • Rice Theorem. • Complexity Classes. • Classes L, NL, P, NP, PSPACE and EXPTIME. • NP Completeness. • Cook-Levin Theorem.

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will: • understand and design Turing machines • understand halting problems • understand complexity classes and the classification of problems in these classes • understand the concept of completeness and be able to solve problems • understand NP-completeness • implement algorithms to solve computationally difficult problems • compose algorithmic ideas for implementing applications
PREREQUISITES	-
TEACHING METHODS	• Face-to-Face
ASSESSMENT METHODS	The language of evaluation is Greek. The assessment method consists of three assignments (30%) and a final written examination (70%). The final examination includes multiple choice questions, short answer questions, and problem-solving questions. The three assignments require the implementation of algorithms in the C programming language. The above evaluation criteria are posted on the course website.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Harry Lewis, Christos Papadimitriou, Στοιχεία θεωρίας υπολογισμού, Εκδόσεις Κριτική, Έκδοση: 1η/2005 2. Michael Sipser, Εισαγωγή στη θεωρία υπολογισμού, Πανεπιστημιακές Εκδόσεις Κρήτης, Έκδοση: 1η/2009 - Related Scientific Journals: Algorithmica Journal of Algorithms ACM Transactions on Algorithms

COMMON ELECTIVE COURSE (ALL SEMESTERS)

SPECIAL ASSIGNEMENT

COURSE UNIT CODE	E27
COURSE UNIT TYPE	Specialization
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4^{th}, 5^{th}
SEMESTER	7^{th}, 8^{th}, 9^{th}
ECTS CREDITS	5
COURSE WEBSITE (URL)	www.eclass.uowm.gr/courses/ICTE246/
TEACHING WEEKLY HOURS	-
INSTRUCTORS	Faculty members and part-time teachers (responsible: Th. Zygiridis)
COURSE CONTENTS	Research-related assignment, based on a combination of knowledge acquired from previous semesters.
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of this course, students will: – become more familiar with the research process, – acquire experience in searching and analyzing the relevant literature, – become familiar with combining knowledge from different subjects, – familiarize with applying theoretical knowledge, – proceed with the critical analysis of research results, – gain experience in working and obtaining results under specific deadlines, – gain experience in writing structured technical reports, – be familiar with the type of work that will be required for the diploma thesis.
PREREQUISITES	-
TEACHING METHODS	- No lectures are conducted

ASSESSMENT METHODS	Summative evaluation of the final thesis, written in Greek. The evaluation is based on the degree of achievement of the objectives set initially, and the quality of the deliverable report. If deemed necessary by the supervisor, an oral and/or a public presentation is conducted.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	Bibliography depends on the content of the selected research project.

7TH SEMESTER – FREE ELECTIVE COURSES

RESEARCH, TECHNOLOGY AND INNOVATION POLICY

COURSE UNIT CODE	E7
COURSE UNIT TYPE	Free elective
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=76
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Samara E.
COURSE CONTENTS	The content of the course includes: • Innovation and competitiveness • Innovation as a management process • Innovation Systems • Technological entrepreneurship • Entrepreneurship and innovation practices • Research, Technology and Innovation Policies in America, Europe and Greece • Measuring indicators of innovation • Development of the Business Canvas • Financial Tools • Writing and Developing a Business Plan

LEARNING OUTCOMES / GENERAL COMPETENCES	This course aims to contribute to meeting the training needs of modern innovation and entrepreneurship techniques and places particular emphasis on the detailed presentation of successful business practices. The material of this course is divided into two parts as follows: The first deals with the process of innovation and its relationship with knowledge, learning and creativity, while the second part with entrepreneurship and its interdependencies with innovation and various systems, innovation policies, with particular emphasis on drawing up and developing a business plan. At the end of the course the student will be able to: • List the types of innovation. • Describe the concepts of attitude, momentum and innovation performance. • Name the difference between innovation and invention. • Describe the types and characteristics of innovation. • Apply the standards of the innovation process. • Recognize innovation systems. • Recognize the types of entrepreneurship. • To select appropriate financial tools for entrepreneurship. • Compare innovation policies. • Write a business plan.
PREREQUISITES	-
TEACHING METHODS	Lectures (13 wks x 4 hrs theory) and two obligatory homework projects.
ASSESSMENT METHODS	100% evaluation of homework business plan. More specifically, students are graded by delivering the business plan in a word format and by delivering a PowerPoint pitching presentation of their business plan. The presentation process is open and involves evaluators from the business, academic and financial worlds.
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. ΚΑΙΝΟΤΟΜΙΑ & ΕΠΙΧΕΙΡΗΜΑΤΙΚΟΤΗΤΑ, 2016, ΕΠΙΣΤ. ΕΠΙΜΕΛΕΙΑ: Κουλουριώτης Δημήτρης, “Bessant J.” “Tidd J.” 2. Επιχειρηματικότητα και Κοινωνική Οικονομία, Έκδοση: 1η/ 2017, Συγγραφείς: Σαρρή Κατερίνα, Τριχοπούλου Άννα,

QUALITY CONTROL

COURSE UNIT CODE	E6
COURSE UNIT TYPE	Free elective
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=64
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Not Available
COURSE CONTENTS	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.
LEARNING OUTCOMES / GENERAL COMPETENCES	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	-
TEACHING METHODS	Lectures
ASSESSMENT METHODS	Final written exam (compulsory), Intermediate written exam (optional)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Statistical Quality Control, G. N. Tagaras. Zitis Publ., 2001. 2. Management and Statistical Quality Control, Ch. Kitsos, Newtech Publ., 2003

ENGLISH III (ACADEMIC WRITING)

COURSE UNIT CODE	EH2
COURSE UNIT TYPE	Elective
LEVEL OF STUDY	Undergraduate
YEAR OF STUDIES	4th
SEMESTER	7th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE391/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Tavoultzidou S.
COURSE CONTENTS	• Paraphrasing techniques to avoid plagiarism • Cause & Effect • Comparing & Contrasting • Drawing conclusions • Paragraph Organisation (Definition, Generalization/ Specialization, Clarification, Use / Utilization of Examples, Classification, Description) • Text Composition (content cohesion and coherence, common mistakes) • Describing Graphs and Trends • Writing Introductions and Conclusions • Discussing Results • Describing Processes and Methods • Referring to Sources • Being Critical and Evaluating

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course students will be able to: • identify Academic discourse characteristics and style, as well as the main academic genres, i.e., scientific article, thesis, etc. • apply writing skills and strategies employed for writing and editing a text, i.e., paragraph structure, content, consistency, cohesion, coherence, syntactic structures, specialist lexis, punctuation • apply academic skills to write academic discourse (scientific texts, reports, descriptions, research papers, theses, etc.) • use the relevant literature The main concern of the course is to enhance students' writing skills, critical thinking, linguistic and intercultural awareness required to meet: • their needs as Electrical and Computer Engineering students at undergraduate level • their needs regarding postgraduate studies, European Programmes (Erasmus+, etc.) • their career pursuits as electrical and computer engineers, or academic researchers in a national, international, or interdisciplinary environment
PREREQUISITES	Required Level of English: B2 in accordance with the Joint European Framework for Modern Languages
TEACHING METHODS	• Face-to face • Synchronous distance learning (zoom), if required
ASSESSMENT METHODS	• End-semester exams test (60%) • Mid-semester test (20%) • Project (20%) – Oral presentation/written project
LANGUAGE OF INSTRUCTION/ EXAMS	English-Greek
RECOMMENDED BIBLIOGRAPHY	1. Integrating Technical & Academic Writing into your English Course - Theory and Practice - Κωδ. Βιβλίου Εύδοξο: 86199178 Έκδοση: 1η/2019, Συγγραφείς: E. Panourgia 2. University Writing Course Student's Book with answers, Κωδ. Βιβλίου στον Εύδοξο: 10686, Έκδοση: 1η έκδ./2007, Morley John, Doyle Petropolis Ian 3. Ακαδημαϊκή Γραφή, Κωδ. Βιβλίου στον Εύδοξο: 68391268, Έκδοση: 3η/2017, Ευδωρίδου Έλσα -Καρακασίδης Θόδωρος

8TH SEMESTER – FREE ELECTIVE COURSES

PROJECT MANAGEMENT

COURSE UNIT CODE	E38-H
COURSE UNIT TYPE	Free elective
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=219
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Not Available
COURSE CONTENTS	Project: notion, features and project types. Main factors and variables that affect the operation, implementation and success of a project. Environment and groups that affect the implementation of a project. Project's lifecycle. Association of cost, quality, added value and lifecycle. Selection criteria and project's evaluation techniques. Project planning, management and operation. Work, Product, Cost and Organization Breakdown Structure. Project resources. Actions, milestones and time-scheduling. Reticular analysis: AOA and AON, CPM and PERT. Time, cost, and project compression. Budget composition and observation. Fundamental project implementation observation indices: CPI (Cost Performance Index) and SPI (Schedule performance Index).

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, students will be able to: • Recognize what a project is, distinctive features of a project and its' importance for companies and organizations • Understand the importance of the complexity and variability of the implementation environment of a project and the profit groups for the successful beginning, implementation and delivery of it • Recognize the relation between cost, time and quality of a project • Recognize the crucial factors and variables that affect the successful completion of a project • Use the techniques and methodologies for the evaluation, selection and rejection of a project • Comprehend the importance of the project's lifecycle and the way this contributes to the successful observation and implementation • Be acquainted with the tools and methodologies for the project's organization, time-scheduling, observation and management • Learn and use the methods for composing, observing and studying a project budget and the financial dimensions, in general • Define the CPI and SPI indices, interpret them and make decisions on the project implementation
PREREQUISITES	-
TEACHING METHODS	• Face-to-face • Possibility of synchronous distance learning
ASSESSMENT METHODS	100% Final written examination
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Larson, E.W., and Gray C.F., (2018), «Διοίκηση Έργων : Η Διαδι-κασία Διοίκησης», 7η Έκδοση, Εκδόσεις Κλειδάριθμος 2. Kerzner, H., (2017), «Διοίκηση Έργων», Εκδόσεις ΤΖΙΟΛΑ 3. Wysocki, R. K., (2014), Effective Project Management: Traditional, Agile, Extreme», 7th ed., WILEY, UK. 4. Burke, R. (2014), «Διαχείριση Έργου - Αρχές και Τεχνικές», Εκ-δόσεις Κριτική, Αθήνα 5. Burke, R. (2013), «Project management: Planning and Control Techniques», 5th ed., WILEY, UK.

OPERATIONS RESEARCH

COURSE UNIT CODE	E36
COURSE UNIT TYPE	Specific background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ICTE318/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Kyriakidis T.
COURSE CONTENTS	• Introduction • Operations Research applications • Mathematical modeling of Linear Programming (LP) problems • Graphical solution for LP problems • Simplex method • Interpretation, sensitivity analysis, special cases • LP problem solving using computer software (lindo, lingo, EXCEL solver). • Dual problem • Integer programming • Branch and Bound algorithm. • Transportation problems • Network problems • Project scheduling • Decision support theory • Inventory management

LEARNING OUTCOMES / GENERAL COMPETENCES	The course introduces students to the basics of Quantitative Analysis. Special emphasis is given to optimization techniques for the planning, design and synthesis of production processes and systems. The course also includes the examination of case studies that lead to a better understanding of the theory and prepare the students in modeling process optimization problems. Upon completion of the course students will be able to use decision-making tools for systems such as inventory management techniques, equipment maintenance, quality control, demand forecasting and production planning, as well as their interactions with external factors and will be able to: • understand the basic mathematical programming (Linear and Nonlinear) concepts and methods, • model real-world operational problems by the development of appropriate mathematical programming models, • solve mathematical programming models by employing the appropriate operations research methodologies and algorithms, • handle data and solve mathematical programming models using computer software, • perform sensitivity analyses on the results of operations research problems, • interpret the results of an operations research problem's
PREREQUISITES	Statistics
TEACHING METHODS	• Lectures and lab exercises. • Asynchronous distance learning through the eclass
ASSESSMENT METHODS	Intermediate written exam (optional) Final written exam (compulsory): Problem solving
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	- Recommended Book Resources: 1. Επιχειρησιακή Έρευνα, Παντελής, Υψηλάντης 2. Εισαγωγή στην Επιχειρησιακή έρευνα, Κολέτσος Ιωάννης, Στογιάννης Δημήτρης 3. Εισαγωγή στην Επιχειρησιακή Έρευνα, 10η Έκδοση, Taha A. Hamdy 4. ΠΟΣΟΤΙΚΗ ΑΝΑΛΥΣΗ ΓΙΑ ΤΗ ΛΗΨΗ ΔΙΟΙΚΗΤΙΚΩΝ ΑΠΟΦΑΣΕΩΝ ΤΟΜΟΣ Α΄, ΟΙΚΟΝΟΜΟΥ ΓΕΩΡΓΙΟΣ, ΓΕΩΡΓΙΟΥ ΑΝΔΡΕΑΣ 5. Διοικητική επιστήμη, Anderson David R., Sweeney Dennis J., Williams Thomas A., Martin Kipp 6. Επιχειρησιακή Έρευνα και Βελτιστοποίηση για Μηχανικούς, Καρλαύτης Μ., Λαγαρός Ν. 7. SCHAUM'S ΕΠΙΧΕΙΡΗΣΙΑΚΗ ΕΡΕΥΝΑ, RICHARD BRONSON, GOVINDASAMI NAADIMUTHU - Recommended Article/Paper Resources: 1. European Journal of Operational Research, 2. Computers & Operations Research, 3. Omega, 4. Computers and Chemical Engineering

PRINCIPLES OF ADMINISTRATION AND ADMINISTRATION DECISION MAKING

COURSE UNIT CODE	EH4
COURSE UNIT TYPE	Specific background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	4th
SEMESTER	8th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY130/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Tsalikakis A.
COURSE CONTENTS	The concept of Business and Organization, the reasons for creation and their importance. Operating environment and resources (physical, financial and human) of businesses. Basic principles and functions of management: Planning, Organization, Management and Control. Targeting: Identification, evaluation, prioritization and criteria for success of objectives. Relationship between planning and control. Planning and decision making. Procedure, stages, risk and uncertainty of decision making. Decision-making environment, types of decisions and factors that influence the process.

LEARNING OUTCOMES / GENERAL COMPETENCES	The course introduces students to the concept of business, organization and their operating principles. Emphasizes the importance of the environment (internal and external) in which they operate and make decisions. Through lectures and targeted case studies they will understand basic concepts and tools useful for their life and studies. Upon completion of the course students will be able to: • know what planning and organization are as well as their importance in their personal and professional life. • Understand the importance of the operating environment of organizations, of its complexity and variability, and how this affects the operation of businesses and decision making. • know and apply the basic functions of the administration • know the importance of the goals, how they are prioritized and evaluated as well as the factors that influence their successful implementation. • understand the importance of decision making and the risk involved • Implement the decision-making process and understand the factors that affect it
PREREQUISITES	-
TEACHING METHODS	Face to face
ASSESSMENT METHODS	Final exam (100%)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. ΟΡΓΑΝΩΣΗ ΚΑΙ ΔΙΟΙΚΗΣΗ ΕΠΙΧΕΙΡΗΣΕΩΝ, ΜΑΝΤΖΑΡΗΣ ΙΩΑΝΝΗΣ 2. ΜΑΝΑΤΖΜΕΝΤ, Μπουραντάς Δημήτρης 3. ΜΑΝΑΤΖΜΕΝΤ ΑΡΧΕΣ ΔΙΟΙΚΗΣΗΣ ΕΠΙΧΕΙΡΗΣΕΩΝ, ΧΥΤΗΡΗΣ Σ. Λ. 4. Αποφάσεις - Λήψη Αποφάσεων, Δημητρόπουλος Ευστάθιος

9TH SEMESTER – FREE ELECTIVE COURSES

NON-DESTRUCTIVE TESTING

COURSE UNIT CODE	EH6
COURSE UNIT TYPE	Free elective
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://ece.uowm.gr/courses.php?view_course=190
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Not Available
COURSE CONTENTS	Non-destructive testing of materials and structures. Radiographic method, ultrasound method, electromagnetic methods (dielectric, magnetic leak), magnetic particle and liquid penetration methods, visual inspection, thermography method and other methods. International standards and specifications
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, the student will: • has understood the phenomenon of each recognized Non-Destructive Control method, • can perform simple laboratory tests with at least 4 methods (Magnetic, Penetrating, Diurnal, Ultrasonic), • can interpret industrial radiographs, • can evaluate the application and expected errors in the test sample, • can choose the appropriate method of Non-Destructive Control, • can interpret specifications, • can write simple non-destructive reporting reports, • develops problem solving capability and through the evaluation
PREREQUISITES	-
TEACHING METHODS	Lectures, Lab exercises
ASSESSMENT METHODS	Final exam 100%
LANGUAGE OF INSTRUCTION/ EXAMS	Greek

RECOMMENDED BIBLIOGRAPHY	1. Βιβλίο στον Εύδοξο [320267]: ΜΗ ΚΑΤΑΣΤΡΟΦΙΚΟΙ ΕΛΕΓΧΟΙ, ΘΕΟΔΩΡΟΣ ΜΑΤΙΚΑΣ, ΔΗΜΗΤΡΙΟΣ ΑΓΓΕΛΗΣ

COMPUTERS AND EDUCATION

COURSE UNIT CODE	E41
COURSE UNIT TYPE	Free elective
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	5th
SEMESTER	9th
ECTS CREDITS	5
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/ECE389/
TEACHING WEEKLY HOURS	4
INSTRUCTORS	Lazaridis V.
COURSE CONTENTS	Development of student activities that will utilize: a. modern technological tools (educational software, software tools of general and special use, multimedia/ hypermedia tools) b. Internet and WWW services, tools and applications c. mobile technologies and their relevant applications. Evaluation of pedagogical/ teaching methods. They shall have the ability to evaluate User Interface of educational applications, as well as the learner-learning results (teaching effectiveness).
LEARNING OUTCOMES / GENERAL COMPETENCES	Upon completion of course, students will be able to: • Define Educational Technology and describe the past and the present of the area as well as the factors that affect it. • State arguments that advocate for the use of technology in education. • Define the general categories of technological resources (hardware and software) that can be utilized in Education. • Know the teaching practices and strategies. • Integrate technology that reflects the instructional and constructive approaches to teaching and learning. • Design strategies of technology integration in education, realize them and design action research which will evaluate the effect of those strategies.
PREREQUISITES	-
TEACHING METHODS	Face to face Contemporary distance learning available

ASSESSMENT METHODS	Assessment method: Multiple-choice tests
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Γρηγοριάδου, Μ., κ.α. (2009). Διδακτικές Προσεγγίσεις και Εργαλεία για τη διδασκαλία της Πληροφορικής. Εκδ. Κλειδάριθμος 2. Κόμης, Β. (2005). Εισαγωγή στη Διδακτική της Πληροφορικής.

OPTIONAL COURSES

RESEARCH METHODOLOGIES AND SCIENTIFIC WRITING

COURSE UNIT CODE	EH5
COURSE UNIT TYPE	General Background
LEVEL OF STUDY	undergraduate
YEAR OF STUDIES	4th
SEMESTER	Spring
ECTS CREDITS	2
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/HMMY111/
TEACHING WEEKLY HOURS	2
INSTRUCTORS	

COURSE CONTENTS

The syllabus of the course includes the following lessons:

- 1st Lesson: «Introduction to scientific research»

Characteristics of scientific research, types of research, discrimination of research types, stages of scientific research

- 2nd Lesson: «Key parts of research reports: Research hypotheses»

Selection of the research topic, the title of the research, introduction, identification and importance of the problem, the purpose of the research

- 3rd Lesson: «Key parts of research reports: Structure»

Literature review, design of experiments, results, conclusions, suggestions for further research, references, appendixes

- 4th Lesson: «Research ethics»

ethics in science, methodologies of scientific research, purpose of scientific research

- 5th Lesson: «Overview of research process»

Stages of research, conceptual phase, design phase, empirical phase, analytical phase

- 6th Lesson: «Research tools»

Simulations, experiments, experimental design, questionnaires, interviews

- 7th Lesson: «Data acquisition methods: Interviews and questionnaires»

Data collection techniques, observation, interviews, questionnaires, questionnaire design, sampling, analysis of results

- 8th Lesson: «Data acquisition methods: Literature review»

Search in databases, publishing companies, conference proceedings, scientific journals, technical reports

- 9th Lesson: «Scientific writing»

Structure of scientific research, rules of scientific writing, thesis structure and organization

- 10th Lesson: «Structure of research thesis: Introduction»

Cover, preface, summary, table of contents, abbreviations/ nomenclature, introduction, main topic, discussion, references

- 11th Lesson: «Structure of research thesis: Writing»

Writing of equations, figures, references, plagiarism

- 12th Lesson: «Presentation of research thesis: Structure»

Types of presentation, structure of the presentation, relation between the manuscript of the research thesis and the research presentation

- 13th Lesson: «Presentation of research thesis: Time management»

- Time management, presentation of conclusions,

LEARNING OUTCOMES / GENERAL COMPETENCES	Upon successful completion of the course, the student shall be able to: • Recognize the nature of a scientific problem and suggest potential solutions • Understand the basic principles of scientific research • Collect the required data and references • Write a research thesis by following the main rules concerning the structure of the thesis, the presentation and discussion of the results and the drawing of conclusions • Present scientific results based on pre-defined specifications
PREREQUISITES	-
TEACHING METHODS	• Face to face • Distance learning
ASSESSMENT METHODS	- personal assignments/projects (80% of the final grade) - Oral examination – presentation of students' projects in the classroom, questions and discussion (20% of the final grade)
LANGUAGE OF INSTRUCTION/ EXAMS	Greek
RECOMMENDED BIBLIOGRAPHY	1. Α. Σαχίνη-Καρδάση, "Μεθοδολογία έρευνας", Εκδ. Βήτα, 2007 2. Π.Γ. Κυριαζόπουλος, "Μεθοδολογία έρευνας εκπόνησης διπλωματικών εργασιών", Εκδόσεις Σύγχρονη Εκδοτική, 2011 3. Ι. Μαντζάρης, "Επιστημονική έρευνα: συγγραφή-διαμόρφωση-παρουσίαση επιστημονικών εργασιών", Εκδ. Εντυπώσεις, 2007 4. Π. Λατινόπουλος, "Τα πρώτα βήματα στην έρευνα: ένας χρηστικός οδηγός για νέους ερευνητές", Εκδ. Κριτική, 2010 5. Ζ. Αγιουτάντης, "Ένας πρακτικός οδηγός για τη συγγραφή τεχνικών κειμένων", Εκδόσεις Ίων, Αθήνα, Ελλάδα, 2003