

COURSE OUTLINE

1. GENERAL

SCHOOL			
DEPARTMENT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	Y404-2023	SEMESTER	4th Semester
COURSE TITLE	Electronics		
TEACHING ACTIVITIES If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.		TEACHING HOURS PER WEEK	ECTS CREDITS
		4	5.0
COURSE TYPE Background, General Knowledge, Scientific Area, Skill Development	Background		
PREREQUISITES	It is suggested that the student attended the following: Calculus I and II Differential Equations Vectors-Algebra Introduction to Physics I and II		
TEACHING & EXAMINATION LANGUAGE:	Greek		
COURSE OFFERED TO ERASMUS STUDENTS:	YES		
COURSE URL:	https://eclass.emt.duth.gr/		

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

The purpose of the course is to introduce students to the basic concepts of electronics, the properties and functions of electronic components, as well as the analysis, design, and testing of electronic circuits. Specifically, the goal of the course is to provide fundamental knowledge of electronics for the most basic electronic components such as diodes, bipolar junction transistors (BJTs), and field-effect transistors (FETs), as well as the analysis and design of simple and complex electronic circuits formed by these components. During the lectures, exercises are solved to deepen understanding of each section. At the same time, students are given the opportunity, for better understanding of the electronic circuits presented, to analyze them with the help of simulation programs (Electronics Workbench, etc.) both during the lectures and during the Laboratory Exercises. Upon successful completion of the course, the student will be able to:

- Distinguish the basic electronic components and know the different ways of connecting these components in a circuit.
- Recognize basic electronic circuits and understand their operation.
- Theoretically solve an electronic circuit by applying the laws, rules, and methodologies taught.
- Calculate characteristic parameters of electronic components, bias them appropriately, taking into account design requirements, and determine the characteristics of an electronic component.
- Learn and read datasheets of electronic components.
- Execute a simulation program to check the operation of a circuit.
- Detect faults in simple electronic components and circuits and be able to provide solutions for their repair.
- Design, analyze, and generally handle an electronic circuit.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use, Adaptation to new situations,
Decision making,
Autonomous work,
Teamwork,
Working in an international environment,
Working in an interdisciplinary environment, Production of new research ideas

Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking
Promoting free, creative and inductive reasoning

Search, analysis and synthesis of data and information, ICT Use
Autonomous work
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3. COURSE CONTENT

- Semiconductors: Electronic Structure of Semiconductors, Intrinsic, Extrinsic Semiconductors, Conductivity of Semiconductors.
- Diodes: The p-n Junction, Reverse and Forward Bias of the p-n Junction, Current-Voltage Characteristic Curve (I-V), Circuit Study of Diode Operation – Load Line, Zener Diodes, Voltage Regulator with Zener Diode, Other Types of Diodes (Tunnel Diodes, Photodiodes and Light Emitting Diodes, Schottky Diodes, Varactor Diodes), Diode Circuits.
- Diode Applications: Half-Wave Rectifier Circuits, Full-Wave Rectifier Circuits, Voltage Multipliers, Clipping Circuits, Climbing Circuits.
- Bipolar Junction Transistors (BJT): Structure of Transistors, Operation of Transistors – Transistor Currents, Common Emitter Configuration (C-E), Common Emitter Circuit Analysis, Common Emitter Amplifier, DC and AC Load Lines in a Common Emitter Amplifier, Common Collector Amplifier (CC, or Emitter Follower), The Transistor as a Switch.
- Field-Effect Transistor (FET): Introduction to Field-Effect Transistors (FET), JFET Structure, Operating Principle of JFET, JFET Biasing Methods, JFET as an Amplifier, JFET Amplifier with Common Source (C-S), JFET Amplifier with Common Drain (C-D).
- MOSFET Transistor: Structure, Operating Principle, Basic Circuits.

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD Face to face, Distance learning, etc.	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) Use of ICT in Teaching, in Laboratory Education, in Communication with students	Use of ICT in Teaching Use of ICT in Communication with students

TEACHING ORGANIZATION The ways and methods of teaching are described in detail. Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research& analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc. The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards	<table border="1"> <thead> <tr> <th>Activity</th><th>Workload/semester</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>52</td></tr> <tr> <td>Bibliographic research & analysis</td><td>73</td></tr> <tr> <td>Total</td><td>125</td></tr> </tbody> </table>	Activity	Workload/semester	Lectures	52	Bibliographic research & analysis	73	Total	125
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STUDENT EVALUATION Description of the evaluation process Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others Please indicate all relevant information about the course assessment and how students are informed	Student evaluation languages Greek English Method (Formative or Concluding) Summative <table border="1"> <thead> <tr> <th>Student evaluation methods</th><th>Rate</th></tr> </thead> <tbody> <tr> <td>Intermediate Written Exam</td><td>30</td></tr> <tr> <td>Written Exam with Problem Solving</td><td>50</td></tr> <tr> <td>Written Exam with Short Answer Questions</td><td>20</td></tr> </tbody> </table>	Student evaluation methods	Rate	Intermediate Written Exam	30	Written Exam with Problem Solving	50	Written Exam with Short Answer Questions	20
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5. Suggested Bibliography

- ΗΛΕΚΤΡΟΝΙΚΑ ΚΥΚΛΩΜΑΤΑ, ΘΕΩΡΙΑ ΚΑΙ ΑΣΚΗΣΕΙΣ, Κωδικός Βιβλίου στον Εύδοξο: 41957349, Συγγραφείς: Κ. ΚΑΡΥΜΠΑΚΑΣ, ISBN: 9789603571179, Διαθέτης (Εκδότης): Χριστίνα και Βασιλική Κορδαλή Ο.Ε.

Eudoxus

- Εισαγωγή στην ηλεκτρονική, Κωδικός Βιβλίου στον Εύδοξο: 12173, Συγγραφείς: Τόμπρας Γιώργος Σ., ISBN: 9789605311926, Διαθέτης (Εκδότης): ΔΙΑΥΛΟΣ Α.Ε. ΕΚΔΟΣΕΙΣ ΒΙΒΛΙΩΝ
- Ηλεκτρονική, 9η Έκδοση, Κωδικός Βιβλίου στον Εύδοξο: 122079196, Συγγραφείς: Malvino A., Bates D., Hoppe P., ISBN: 9786182210277, Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.
- Μικροηλεκτρονικά Κυκλώματα, 8η Έκδοση, Κωδικός Βιβλίου στον Εύδοξο: 133045556, Συγγραφείς: Sedra Adel, Smith Kenneth, Carusone Chan Tony, Gaudet Vincent, ISBN: 9789604911875, Διαθέτης (Εκδότης): Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ Ι.Κ.Ε.