ELECTRONICS

1. GENERAL

SCHOOL OF	ENGINEERING		
DEPARTMENT OF	INFORMATICS AND COMPUTER ENGINEERING		
LEVEL OF EDUCATION	UNDERGRADUATE		
COURSE CODE	ICE-3002	**SEMESTER OF STUDIES**	3ο
COURSE TITLE	ELECTRONICS		
INDEPENDENT TEACHING ACTIVITIES *in case the credits are awarded in separate parts of the course e.g. Lectures, Laboratory Exercises, etc. If the credits are awarded uniformly for the whole course, indicate the weekly teaching hours and the total number of credits.*		**WEEKLY HOURS OF TEACHING**	**ECTS CREDITS**
Lectures		3	
Practice -Exercises		1	
Lab		1	
Add rows if needed. The teaching organization and teaching - methods used are described in detail in 4.		**5**	**5**
COURSE TYPE *Background, General Knowledge, Scientific Area, Skills Development*	Background (General Background)		
PREREQUISITE COURSES:	None		
LANGUAGE OF TEACHING AND EXAMS :	Greek and English		
ERASMUS STUDENTS	Yes (English)		
ONLINE COURSE (URL) (if available)	http://www.uniwa.gr/ice/elec.html		

2. LEARNING OUTCOMES

Learning outcomes

The learning outcomes of the course are described, the specific knowledge, skills and abilities of an appropriate level that students will acquire after the successful completion of the course.

Refer to Appendix A.

- *Description of the Level of Learning Outcomes for each course according to the Qualifications Framework of the European Higher Education Area*
- *Descriptive Indicators Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B*
- *Summary Guide for writing Learning Outcomes*

This course is the basic introductory course in the concepts of electronic elements and circuits. Students acquire the necessary knowledge and skills to be able to analyze, simulate and design analog circuits with discrete components linear and non-linear components with direct and alternating, for small input signals.

Upon successful completion of the course the student will be able to:

- recognize circuit components
- calculate and choose the appropriate resistors
- explain the procedure of the superposition principles
- calculate the electrical characteristics of circuits
- produce Theverin and Norton equivalents
- understand the principles behind basic semiconductor arrangements function
- knows the I-V characteristics of electronic arrangements
- carry out polarizations of various electronic devices
- estimate the area of operation of the arrangements
- design the hybrid equivalent of small systems
- judges the arrangements that must be used for his/her construction needs
- use information for the components from constructor's datasheet
- works together with other students to create and present a circuit with the use of

diods and transistors
- evaluates the layouts and selects the appropriate transistor and makes the appropriate connections according to his/her needs

General Abilities

Taking into account the general skills that the graduate must have acquired (as they are listed in the Diploma Supplement and are listed below), which of them is intended for the course ?.

Search, analysis and synthesis of data and information, using the necessary technologies	*Project design and management*
Adaptation to new situations	*Respect for diversity and multiculturalism*
Decision making	*Respect for the natural environment*
Autonomous work	*Demonstration of social, professional and moral responsibility and sensitivity in gender issues*
Teamwork	*Exercise criticism and self-criticism*
Working in an international environment	*Promoting free, creative and inductive thinking*
Work in an interdisciplinary environment	
Production of new research ideas	

- Teanwork
- Search and synthesis of data
- Data analysis
- Decision making in regards to suggested connections

3. COURSE CONTENT

Theoretical part

- Electronic circuit
- Components of an electric circuit
- Kirchhoff laws
- Resistor source connections
- Basic laws and methods of resolution for linear circuits (superposition principle, Theverin theorem, Norton, Millman)
- P-N contacts. Diods I-V characteristics, diods with positive polrarity and negative polarity, characteristics voltage-current for P-N contact diods. Direct workload. Study of diod circuits, diod as a switch, rectification of alternating current, powers supply arrangements, Zener diod, current and voltage stabilizers.
- Introduction to basic concept of amplifying arrangements
- Bipolar junction transistors, Transistor as a switch struction and function of NPN and PNP transistors, Polarization circuits CB, CE, CC. relation between currents I_C, I_B and I_E input output characteristics of BJT
- Field effect transistors(FET) polarizing amplyfyer circuits with contact and field transistors, analysis of the stability of the quiescent point, current sources
- Function parameters and characteristics of amplyfyers in weak signals. Amplyfyer operation with BJT or FET in low frequencies for common emmiter, common base, common collector arangements and for field efect transistors(common source, common drain, common gate). Models and parameters of electronic components, emmulation of said components

Laboratory

- Resistor codes – measuring instruments
- Oscilloscope -voltage measurement – frequency measurement – phase measurement
- Multisim introduction
- Crystal diodes (silicon - germanium)
- Zener diode – voltage stabilizer with Zener diode
- Rectification (simple - double), clipers
- BJT transistor
- Common emmiter amplifier, common collector amplifier
- JFET transistor
- Oscillator

4. TEACHING AND LEARNING METHODS - EVALUATION

METHOD OF DELIVERY *Face to face, Distance education etc.*	In class face to face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of slides for demonstration of the excersises to students. Use of Multisim to simulate the results of the lab excersise.
TEACHING ORGANIZATION *The way and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliography study & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive teaching , Study visits, Study work, artwork, creation. λπ.* *The student study hours for each learning activity are indicated as well as the non-guided study hours so that the total workload at the semester level corresponds to the ECTS standards .*	

Activity	***Semester Workload***
Lectures	39
Practice Exercises that focus on the application of methodologies and analysis of studies	13
Laboratory Excersises	13
Tasks	20
Independent Study	40
Total Course Load (25 hours per credit)	**125**

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, Report / Report, Oral Examination, Public Presentation, Public Presentation, Others* *Explicitly defined assessment criteria are stated and if and where they are accessible to students.*	1. Written final exam (60%) which includes : A. 2 Progress in the duration of the cemester 1. Solving problems with resistor connection, diode excersises and their application, superposition principle, Theverin theorem, Norton(50%) 2. Problem solving with transistor (BJT, FET) or with the use of direct current source exclusively or with alternating current source exclusively and with the use of hybrid parameters (50%) B. Or/And final exam with the above mention thematology II. Active participation for the duration of the class(15%) III. Lab excersises (25%) A) Oral examination (40%) B) Commit exercise paper (20%) C) Final examination (40%)

5. RECOMMENDED-BIBLIOGRAPHY

- Suggested Bibliography:

1. «Ηλεκτρονικά – Δίοδοι και ενισχυτικά στοιχεία», Π. Γιαννακόπουλος, Λύχνος, 2017

2. «Ηλεκτρονική, Αρχές και εφαρμογές», Malvino και Bates, Τζιόλας, 2016

3. «Εισαγωγή στην Ηλεκτρονική» Γ. Τόμπρας, Εκδόσεις Δίαυλος, 2006

4. "The Art of Electronics", Horowitz & Hill, Cambridge University Press, 3rd ed., 2015

5. "Electronic devices and Circuit Theory", R. Boylestal, L. Nashelsky, Prentice Hall, 11th ed., 2012

6. "Microelectronic Circuit Design", R. Jaeger & Blalock, 4th Edition, McGraw Hill, ISBN

978-0-07-338045-2, Εκδόσεις Τζιόλα, 2011.

7. «Microelectronic Circuits» A. S. Sedra and K. C. Smith, 6th, Oxford University Press, 2010

8. "Advanced Electronic Circuits", U. Tietze, Springer Verlag, 1998.

9. "Computerized Circuit Analysis Using SPICE Programs", B.M Wilamowski, R.C. Jaeger, McGraw-Hill, 1997

10. "Electronic Circuits Analysis, Simulation and Design", N. R. Malik, Prentice Hall, 1995.

- Related scientific journals:

- http://101science.com/basicelectronics.htm
- http://101science.com/basicelectronics.htm
- http://www.electronics-tutorials.ws/logic/logic_1.html
- http://www.ijecse.org/