

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	GRADUATE		
COURSE CODE	8002005	SEMESTER	2
COURSE TITLE	RF Electronics and Antennas		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS (ECTS)	
Lectures	4	9	
E-learning	2		
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Scientific Area		
PREREQUISITE COURSES:	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek and English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	http://ies.teipir.gr		

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area
- Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B
- Guidelines for writing Learning Outcomes

Upon successful completion of this course, the students possess advanced knowledge, skills and competences that enable them to:

- Quote the basic subsystems of an RF transmitter and receiver communications system and describe by drawing diagrams
- Describe the functionality of and design RF filters
- Describe the functionality of and design low noise and power amplifiers / design low noise amplifiers using PCB technology
- Describe the functionality of an RF oscillator, a frequency up and down frequency converter, and design a frequency converter using PCB technology
- Describe the functionality of antenna systems and match antenna loads to transmitter and

<p>receiver components</p> <ul style="list-style-type: none"> • Design and develop an RF transmitter or receiver component including an analog filter, a low noise amplifier and a frequency down-converter. 																		
<p>General Competences</p> <p><i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i></p> <table border="0"> <tr> <td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td> <td><i>Project planning and management</i></td> </tr> <tr> <td><i>Adapting to new situations</i></td> <td><i>Respect for difference and multiculturalism</i></td> </tr> <tr> <td><i>Decision-making</i></td> <td><i>Respect for the natural environment</i></td> </tr> <tr> <td><i>Working independently</i></td> <td><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td> </tr> <tr> <td><i>Team work</i></td> <td><i>Criticism and self-criticism</i></td> </tr> <tr> <td><i>Working in an international environment</i></td> <td><i>Production of free, creative and inductive thinking</i></td> </tr> <tr> <td><i>Working in an interdisciplinary environment</i></td> <td><i>.....</i></td> </tr> <tr> <td><i>Production of new research ideas</i></td> <td><i>Others...</i></td> </tr> <tr> <td></td> <td><i>.....</i></td> </tr> </table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>	<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>	<i>Working in an interdisciplinary environment</i>	<i>.....</i>	<i>Production of new research ideas</i>	<i>Others...</i>		<i>.....</i>
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(3) COURSE CONTENT

<p>This module aims at presenting the state-of-the-art in design and development of RF electronic systems and transmitting or receiving antennas. In this context, we present the basic-most subsystems of RF transceivers, including frequency converters, amplifiers, filters and antennas. In parallel, after a brief transmission line theoretical framework, basic RF electronic design principles are being taught. Finally, antenna radiation mechanisms are introduced and studied from a component-equivalent point of view.</p> <p>The following units are covered in this module:</p> <ul style="list-style-type: none"> • RF transceivers • RF filters • Low-noise and power amplifiers • RF oscillators • Mixers, frequency up and down converters • Antennas
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(4) TEACHING and LEARNING METHODS - EVALUATION

<p>DELIVERY <i>Face-to-face, Distance learning, etc.</i></p>	<ul style="list-style-type: none"> • Face to face lectures in class • E-learning
<p>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	<ul style="list-style-type: none"> • Use of electronic presentation with multimedia content in class, • Student support through the course webpage and the departmental e-learning platform (moodle), • Electronic communication of instructors and students, through the course webpage and by e-mail.

<p style="text-align: center;">TEACHING METHODS</p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<p>Lectures, lab practice, homework assignments / project, study.</p> <table border="1" data-bbox="683 342 1380 943"> <thead> <tr> <th style="text-align: center;">Activity</th> <th style="text-align: center;">Semester workload (hours)</th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">52</td> </tr> <tr> <td>E-learning</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Study lecture material</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Lab practice</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Report on lab practice</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Homework assignments or project and report (individual or group)</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Study and preparation for the exams</td> <td style="text-align: center;">36</td> </tr> <tr> <td>Visit a company / production plant / institution</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Course Total</td> <td style="text-align: center;">270</td> </tr> </tbody> </table>	Activity	Semester workload (hours)	Lectures	52	E-learning	26	Study lecture material	52	Lab practice	26	Report on lab practice	26	Homework assignments or project and report (individual or group)	50	Study and preparation for the exams	36	Visit a company / production plant / institution	2	Course Total	270
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<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Student performance is evaluated by:</p> <ul style="list-style-type: none"> ● Interim written examination (20%) ● Final written examination (40%) ● Performance in practice sessions / lab skills (20%) ● Homework assignments / Reports (20%) 																				

(5) ATTACHED BIBLIOGRAPHY

<p><u>-Recommended Books</u></p> <ol style="list-style-type: none"> 1. Balanis, C. A., Antenna Theory: Analysis and Design, Wiley-Interscience, 2005. 2. Balanis, C. A., Advanced Engineering Electromagnetics, Wiley, 2012. 3. Maas, S. A., Microwave Mixers, Artech House, 1993. 4. Razavi, B., RF Microelectronics, Prentice Hall, 2011. 5. Reinhold, L., and Bogdanov, G., RF Circuit Design: Theory and Applications, Prentice Hall, 2008. 6. Sedra, A. S., and Smith, K. C., Microelectronic Circuits, Oxford University Press, 2009. 7. Van de Roer, T. G., Microwave Electronic Devices, Chapman and Hall, London, UK, 1995. <p><u>-Relevant Journals:</u></p> <ol style="list-style-type: none"> 1. IEEE Transactions on Microwave Theory and Techniques / IEEE Microwaves Theory and Techniques Letters

2. IEEE Transactions on Antennas and Propagation / IEEE Antennas and Propagation Magazine / IEEE Antennas and Propagation Letters
3. Microwave and Optical Technology Letters