

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	2604006	SEMESTER	4
COURSE TITLE	Transmission Lines		
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	2	4	
Laboratory	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>	Special Background Course		
PREREQUISITE COURSES:	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English)		
COURSE WEBSITE (URL)	http://electronics.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 module students possess advanced knowledge, skills and competences in the subject of Transmission Lines that enable them to:

- interpret the wave propagation phenomena through transmission lines at high frequencies,
- describe the main types of transmission lines and how they differentiate and work at high-frequency ranges up to microwave frequencies,
- explain the concept of distributed characteristics and determine the characteristic impedance of the lines,
- explain the meaning of incident and reflected waves as well as the creation of standing waves along a line,
- calculate the form of standing waves for various terminations, the input impedance of circuits

- of lines, and the ability to match them using stubs and $\lambda/4$ transformers,
- calculate distributed passive components at high frequencies using shorted or open lines,
 - calculate the basic parameters of lines by using the Smith chart.

General Competences

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>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>

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team work

(3) COURSE CONTENT

Theory

1. Introduction to types and applications of transmission lines.
2. Distributed parameters and differential equations of the uniform transmission lines.
3. Characteristic impedance and transmission coefficient.
4. Input impedance and transmission line networks.
5. Reflection coefficient and matched lines.
6. Open and short circuited lines.
7. Equivalent two-port models.
8. Lossless lines, standing wave ratio and voltage standing waves.
9. Matching techniques – use of stubs.
10. Properties of lossless lines.
11. Resonant frequencies of short and open doubly-terminated lines.
12. The Smith chart and its applications.
13. Solving transmission line problems using the Smith charts.

Laboratory

1. Transmission lines simulator
2. Study of resonance conditions using the transmission lines simulator
3. Two-port circuit chain for lossy transmission lines
4. Two-port circuit chain for lossless transmission lines
5. Standing waves in High frequency Lecher device
6. Load detection using Lecher and Smith chart
7. Standing waves in waveguides
8. T resonators measurement using a Network Analyzer
9. Solving Transmission lines problems using a simulation software

(4) TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;">DELIVERY <i>Face-to-face, Distance learning, etc.</i></p>	Face to face lectures												
<p style="text-align: center;">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, • Electronic communication of instructors and students, through the course webpage and by e-mail. • Use of special software tools for transmission line simulation and interpretation. 												
<p style="text-align: center;">TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <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, Laboratory experiments, study.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="background-color: #e0e0e0;">Activity</th> <th style="background-color: #e0e0e0;">Semester workload (hours)</th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Study for lectures</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Laboratory experiments using software tools</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Study and preparation for exams</td> <td style="text-align: center;">16</td> </tr> <tr> <td>Course Total</td> <td style="text-align: center;">120</td> </tr> </tbody> </table>	Activity	Semester workload (hours)	Lectures	26	Study for lectures	52	Laboratory experiments using software tools	26	Study and preparation for exams	16	Course Total	120
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<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION <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>Final grade is the weighted average of</p> <p>(i) Lecture part grade x 60%</p> <p>(ii) Laboratory part grade x 40%</p> <p>Lecture part grade:</p> <ul style="list-style-type: none"> • Final written (100%) <p>Laboratory part grade:</p> <p>Average of the grades received in each weekly Laboratory Experiment.</p>												

(5) ATTACHED BIBLIOGRAPHY

<p><u>Essential reading</u></p> <p>Lecture notes</p> <p><u>Recommended Books</u></p> <ul style="list-style-type: none"> • JOHNSON, A., Transmission Lines and Networks, McGraw-Hill. • CHIPMAN, R.A., Transmission lines, McGraw-Hill. • SINNEMA, W., Electronic Transmission Technology, Lines, Waves and Antennas, Prentice Hall. • ORFANIDIS, S.J., Electromagnetic Waves and Antennas.
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