

# COURSE OUTLINE

## (1) GENERAL

<b>SCHOOL</b>	Economics, Management and Informatics		
<b>ACADEMIC UNIT</b>	Department of Informatics & Telecommunications		
<b>LEVEL OF STUDIES</b>	Master of Science		
<b>COURSE CODE</b>		<b>SEMESTER</b>	1 <sup>st</sup>
<b>COURSE TITLE</b>	Satellite Communications		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <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>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
Total		3	8
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Mix of general and special background		
<b>PREREQUISITE COURSES:</b>	-		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	English		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>	<a href="https://eclass.uop.gr/courses/DIT124">https://eclass.uop.gr/courses/DIT124</a>		

## (2) LEARNING OUTCOMES

<p><b>Learning outcomes</b>  <i>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.</i></p> <p>Consult Appendix A</p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</li> <li>• Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</li> <li>• Guidelines for writing Learning Outcomes</li> </ul>																			
<p>On successfully completing this course, students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand and describe the key features of satellite communications systems</li> <li>• Describe different methods of error detection &amp; correction, and data encoding</li> <li>• Understand the digital modulation techniques and calculate system noise and error rates</li> <li>• Understand different multiple access methods and calculate the capacity of a communication channel</li> <li>• Describe different antennas and array structures, characteristics and applications</li> <li>• Describe the radiowave propagation channel and the associated constraints</li> <li>• Describe various standard regarding digital broadcasting systems and VSATs</li> <li>• Calculate a link budget and its constituent elements</li> <li>• Understand different optical wireless techniques for space applications</li> </ul>																			
<p><b>General Competences</b>  <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> <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>.....</td> </tr> <tr> <td><i>Production of new research ideas</i></td> <td><i>Others...</i></td> </tr> <tr> <td></td> <td>.....</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>Production of new research ideas</i>	<i>Others...</i>		.....
<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>Production of new research ideas</i>	<i>Others...</i>																		
	.....																		
<p>Search for, analysis and synthesis of data and information, with the use of the necessary technology</p>																			

## (3) SYLLABUS

<ul style="list-style-type: none"> <li>• Overview of satellite communications</li> <li>• Satellite orbits</li> <li>• Antennas, arrays, characteristics and applications</li> <li>• Microwave propagation characteristics</li> <li>• Noise in satellite communications</li> <li>• Digital transmission techniques</li> <li>• Link budget analysis</li> <li>• Multiple access techniques, interferences and capacity</li> <li>• Digital broadcasting systems and VSATs</li> <li>• Optical wireless communication techniques for space applications</li> <li>• Experimental systems cases</li> </ul>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

#### (4) TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;"><b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i></p>	Face to face	
<p style="text-align: center;"><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	PowerPoint presentations <a href="#">STK software</a> by AGI Course Management System for Asynchronous eLearning via web browser (e-class)	
<p style="text-align: center;"><b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail. 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>	<i>Activity</i>	<i>Semester workload</i>
	Lectures	39 hours
	Study	108 hours
	Assignments	50 hours
	Exams	3 hours
<b>Course total</b>	<b>200</b>	
<p style="text-align: center;"><b>STUDENT PERFORMANCE EVALUATION</b> <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>The language of evaluation is English.</p> <p>The performance evaluation will be with written exams at the end of the semester or written exams and home assignments. Home assignments will contribute to the final grade with a percentage ranging between 20% and 30%.</p> <p>The written exams will include a mix of problem solving, multiple choice and short-answer questions.</p> <p>The home assignments can include problem solving, team projects, public presentation, report writing.</p>	

#### (5) ATTACHED BIBLIOGRAPHY

<p>- <i>Suggested bibliography:</i></p> <ul style="list-style-type: none"> <li>• B. Evans, "Satellite Communication Systems," 3rd edition, IEE, 2009.</li> <li>• T. Pratt, C. W. Bostian, and J. E. Allnutt, "Satellite Communications," 2nd edition, Wiley, 2003.</li> <li>• G. Maral and M. Bousquet, "Satellite Communication Systems," 5rd edition, Wiley, 2010.</li> <li>• C. Balanis, "Antenna Theory: Analysis and Design," 3rd edition, Wiley, 2005.</li> <li>• M. K. Simon, "Bandwidth-Efficient Digital Modulation with Application to Deep-Space Communications," Wiley, 2003.</li> <li>• M. S. Reid, "Low-Noise Systems in the Deep Space Network," Wiley, 2008.</li> <li>• H. Hemmati, "Deep Space Optical Communications," Wiley, 2006.</li> <li>• D. H. Rogstad, A. Mileant, and T. T. Pham, "Antenna Arraying Techniques in the Deep Space Network," Wiley, 2003.</li> <li>• W. A. Imbriale, S. Gao, and L. Boccia, "Space Antenna Handbook," Wiley, 2012.</li> <li>• L. C. Andrews and R. L. Phillips, "Laser Beam Propagation through Random Media," 2nd edition, SPIE Press, 2005.</li> </ul> <p>- <i>Related academic journals:</i></p> <ul style="list-style-type: none"> <li>• International Journal of Satellite Communications and Networking</li> <li>• IEEE Transactions on Broadcasting</li> </ul>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------