

## COURSE OUTLINE

### (1) GENERAL

<b>SCHOOL</b>	SCHOOL OF SCIENCES		
<b>ACADEMIC UNIT</b>	PHYSICS DEPARTMENT		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	506	<b>SEMESTER</b>	5,7
<b>COURSE TITLE</b>	OBJECT-ORIENTED PROGRAMMING LANGUAGES		
<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>	
	4	4	
<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>	Special Background/skills development		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	Yes (Greek)		
<b>COURSE WEBSITE (URL)</b>	<a href="http://ecourse.uoi.gr/enrol/index.php?id=882">http://ecourse.uoi.gr/enrol/index.php?id=882</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><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul>
<p><b>This is an advanced course on programming, where students learn to work with C++, the most widely spread programming language. During the course special emphasis is given also to the use of the open source operating system Linux and the object-oriented package ROOT of CERN. The student during the course solves various programming problems and develops them using a computer. After the successful completion of the course the student is in position:</b></p> <ul style="list-style-type: none"> <li>• <b>To develop simple programmes in C++</b></li> <li>• <b>To develop and design its own classes of objects.</b></li> <li>• <b>To develop composite programmes using the large capabilities of C++, like the inheritance and the polymorphism.</b></li> <li>• <b>To develop various programmes using the object-oriented package ROOT of CERN. Within ROOT, the student works with graphics, histograms and performs experimental data fits.</b></li> </ul>

### 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?

Search for, analysis and synthesis of data and information, with the use of the necessary technology  
 Adapting to new situations  
 Decision-making  
 Working independently  
 Team work  
 Working in an international environment  
 Working in an interdisciplinary environment  
 Production of new research ideas

Project planning and management  
 Respect for difference and multiculturalism  
 Respect for the natural environment  
 Showing social, professional and ethical responsibility and sensitivity to gender issues  
 Criticism and self-criticism  
 Production of free, creative and inductive thinking  
 .....  
 Others...  
 .....

Working independently.

Search for, analysis and synthesis of data and information, with the use of the necessary technology.

### (3) SYLLABUS

Learning of C++ programming language.

- i/o instructions
- Control statements
- Functions
- Objects and classes
- Inheritance and polymorphism

Introduction to the object-oriented package ROOT of CERN.

- Histograms and graphics
- Experimental data fits

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

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face-to-face teaching	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	<ul style="list-style-type: none"> <li>• A web page for notes and announcements is used.</li> <li>• Each student uses a computer during the laboratory part of the course.</li> </ul>	
<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</i>	<b>Activity</b>	<b>Semester workload</b>
	Lectures (Theory-Examples)	26
	Laboratory practice	26

<i>visits, project, essay writing, artistic creativity, etc.</i>  <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>	Study and analysis of bibliography	45
	Examinations	3
	Course total	<b>100</b>
<p align="center"><b>STUDENT PERFORMANCE EVALUATION</b></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>Evaluation during the laboratory (50%)</p> <ul style="list-style-type: none"> <li>Development of various programmes by the students in a weekly basis. For the programmes development a computer is used</li> </ul> <p>Written Examination (50%)</p> <ul style="list-style-type: none"> <li>A final written examination at the end of the course, which includes the development of various programs based on what the students learned during the course.</li> </ul> <p>A requirement for the participation to the final written examination is the passing grade during the laboratory evaluation.</p>	

## (5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:

- "Programming with C++", 2<sup>nd</sup> Edition, ISBN: 978-960-461-127-0, JOHN R. HUBBARD
- "Programming with C++", ISBN:978-960-7182-54-8, BJARNE STROUSTRUP
- "The C++ Programming Language", 4<sup>th</sup> Edition, ISBN: 978-960-332-209-2, BJARNE STROUSTRUP