

COURSE OUTLINE

1. GENERAL

SCHOOL			
DEPARTMENT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	CHE808-2023	SEMESTER	8th Semester
COURSE TITLE	Advanced Programming Languages		
TEACHING ACTIVITIES If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.		TEACHING HOURS PER WEEK	ECTS CREDITS
		3	6.0
COURSE TYPE Background, General Knowledge, Scientific Area, Skill Development	Scientific Area		
PREREQUISITES	Algorithms and Computers Programming Differential Calculus I Differential Calculus II Differential Equations Theoretical Mechanics I		
TEACHING & EXAMINATION LANGUAGE:	Greek		
COURSE OFFERED TO ERASMUS STUDENTS:	NO		
COURSE URL:	https://eclass.emt.duth.gr/courses/PHYSICS144/		

2. LEARNING OUTCOMES

Learning Outcomes Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.
The main objective of the first module of the course is to learn the Mathematica software through the analysis of mathematical models that describe natural phenomena in various fields of science, while the purpose of the second module is to analyze problems and program their solution with the C language. An additional objective is the transition to object-oriented programming with C++. The course is interactive and the learning of programming languages takes place during the lectures, as participants are asked to code in real time. After completing the courses, students will be able to: - Recognize the usefulness of analytical mathematical methods and their limitations and utilize computational methods. - Know basic programming concepts, structures and techniques.

- Check the accuracy and appropriateness of a program.
- Know the basic principles of object-oriented programming and how to apply them.
- Create programs with the C programming language and apply the principles of object-oriented programming in C++.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use, Adaptation to new situations,
Decision making,
Autonomous work,
Teamwork,
Working in an international environment,
Working in an interdisciplinary environment, Production of new
research ideas

Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility
and sensitivity to gender issues
Critical thinking
Promoting free, creative and inductive reasoning

Search, analysis and synthesis of data and information, ICT Use
Adaptation to new situations
Decision making
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3. COURSE CONTENT

In module A, the numerical study of properties of dynamical systems is taught using Mathematica and more specifically the following: Analytical and Numerical Solution of D.E., Basic Concepts and Definitions of Dynamical Systems, Autonomous Systems 1 D.o.F., Linear Systems 2x2, Non-Linear Autonomous Systems 2x2, Non-autonomous and Non-linear Systems 2x2

In module B (C/C++) the following will be covered: Basic programming concepts, structures and techniques. Variables, variable types, expressions, numerical calculations. Input/Output Formatting. Operators, Control Structures, Conditions, Decision Structures, Loops. Data Input/Output to Files. Functions and Procedures, Recursion. Lists, Arrays and Search and Sorting Algorithms. Strings. Dynamic Memory Allocation. Structures. Classes, objects, streams, inheritance and polymorphism.

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD Face to face, Distance learning, etc.	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) Use of ICT in Teaching, in Laboratory Education, in Communication with students	Use of ICT in Teaching Use of ICT in Laboratory Education

TEACHING ORGANIZATION The ways and methods of teaching are described in detail. Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research& analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc. The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards	<table border="1"> <thead> <tr> <th>Activity</th><th>Workload/semester</th></tr> </thead> <tbody> <tr> <td>Lectures</td><td>13</td></tr> <tr> <td>Interactive learning</td><td>113</td></tr> <tr> <td>Writing project</td><td>24</td></tr> <tr> <td>Total</td><td>150</td></tr> </tbody> </table>	Activity	Workload/semester	Lectures	13	Interactive learning	113	Writing project	24	Total	150
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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, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others Please indicate all relevant information about the course assessment and how students are informed	Student evaluation languages Greek Method (Formative or Concluding) Summative <table border="1"> <thead> <tr> <th>Student evaluation methods</th><th>Rate</th></tr> </thead> <tbody> <tr> <td>Written Assignment</td><td>25</td></tr> <tr> <td>Written Exam with Problem Solving</td><td>75</td></tr> </tbody> </table>	Student evaluation methods	Rate	Written Assignment	25	Written Exam with Problem Solving	75				
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5. Suggested Bibliography

Επιπρόσθετο υλικό βιβλιογραφίας προτείνεται κατά τη διάρκεια των παραδόσεων.

Eudoxus

- Βιβλίο [122074103]: C Προγραμματισμός, 9η Έκδοση, Paul Deitel, Harvey Deitel Λεπτομέρειες
- Βιβλίο [133029170]: Προγραμματισμός με C, 4η Έκδοση, Forouzan Behrouz, Afyouni Hassan, Αγγελή Χρυσάνθη, Αντωνόπουλος Χρήστος, Ντουφεξή Ιωάννα (Επιστ. Επιμέλεια) Λεπτομέρειες
- Βιβλίο [122078440]: Η ΓΛΩΣΣΑ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΥ C++, BJARNE STROUSTRUP Λεπτομέρειες
- Βιβλίο [112690605]: Προγραμματισμός με C++ Αντικειμενοστρεφής Προσέγγιση, Forouzan B.A., Gilberg R.F.