COURSE OUTLINE

1. GENERAL

SCHOOL			
DEPARTMENT	DEPARTMENT OF PHYSICS UNDEGRADUATE STUDY PROGRAM: PHYSICS		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	CHE713-2023	**SEMESTER**	7th Semester
COURSE TITLE	Computational Physics and its Applications		

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

COURSETYPE Background, General Knowledge, Scientific Area, Skill Development	Scientific Area
PREREQUISITES	None
TEACHING & EXAMINATION LANGUAGE:	Greek
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	https://eclass2.emt.duth.gr/courses/PHYS_G106/

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 course aims to impart to the student the basic knowledge he will need to be able to apply various theories of Physics and applied mathematics (e.g. graphs) through programming and analysis of data he will find/gather/collect from experiments/electronic sources or other ways. The student will be able to work on programming that is required both at a professional level in a variety of jobs (programmer/data analyst/algorithm creator) and at a research level (level of creating original research). This course is necessary for students who intend to work in the field of Computational Physics but also in other fields with intensive use of Computers, Algorithms, Data and Programming.

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 Autonomous work Teamwork Working in an interdisciplinary environment Production of new research ideas Promoting free, creative and inductive reasoning	

3. COURSE CONTENT

General knowledge of algorithms, their connection to Physics problems, implementation and application to real data
Efficiency of algorithms, search algorithms, data classification, etc.
Algorithms for creating graphs, analyzing graph properties, etc.
Study of virus propagation in networks, study of resistance of networks to attacks, analysis of social systems, etc.
Applying models and algorithms to real data with programming and data management.

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 Communication with students
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	

Activity	Workload/semester
Lectures	39
Bibliographic research & analysis	60
Study / creation	80
Total	**179**

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)** Formative **Student evaluation methods** — **Rate** Written Assignment — 60 Essay / Report — 20 Presentation in audience — 20

5. Suggested Bibliography

ΥΠΟΛΟΓΙΣΤΙΚΗ ΦΥΣΙΚΗ, ΑΝΔΡΙΩΤΗΣ Ν. ΑΝΤΩΝΗΣ
Επιστήμη Δεδομένων: Βασικές Αρχές και Εφαρμογές με Python, 2η έκδοση, Grus Joel

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