COURSE OUTLINE

(1) GENERAL

SCHOOL	Science and Technology
ACADEMIC UNIT	Science and Technology
PROGRAMME OF STUDIES	MSc in Data Science
LEVEL OF STUDIES	Postgraduate
COURSE CODE	DSC01 SEMESTER 1
COURSE TITLE	Programming for Data Science
COURSE TYPE *Elective, compulsory*	Compulsory
INSTRUCTOR(S)	Theory: Dr. Christos Berberidis Lab: Dr. Christos Berberidis

INDEPENDENT TEACHING ACTIVITIES *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*	WEEKLY TEACHING HOURS	CREDITS
	3	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

TEACHING ACTIVITIES BREAKDOWN	WEEKLY HOURS
Theory	2
Lab	1
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Speciall background
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://elearn-ucips.ihu.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*
On completing the course, the student will be able to: ● Understand computational thinking in terms of programming methods and data structures ● Capture and represent data and understand basic analysis, processing and visualization tasks

- Familiarise with the implementation of basic data analysis algorithms and tasks

- Use software tools and programming languages for data science

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*......*
Production of new research ideas	*Others…*
	....

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Teamwork
- Production of free, creative, and inductive thinking

(3) SYLLABUS

- Programming for Data Science methodologies
- Data types, their hierarchy and representation
- Basic tasks of data analysis and processing
- Programming languages and tools

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Hybrid: Face to face and synchronous distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT in Teaching** During the educational process, various machine learning and programming tools are used, along with the material available at the e-learning platform. The hybrid teaching method involves synchronous learning with the support of the videoconferencing tool Zoom. Students are taught a variety of tools related to the course content and material. **Use of ICT in Communication with students** • The course material (slides, scientific articles, exercises, etc.) is posted on the course page at the e-learn platform (Moodle). • Use of Moodle Forums announcements. • Live video meetings via Zoom/Teams. • Contact via email.

TEACHING METHODS	Activity	Semester workload
The manner and methods of teaching are described in detail.	Lectures	20 hrs.
Lectures, recitation, 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.	Lab	10 hrs.
	Project	40 hrs.
	Exams	3 hrs.
	Non-Directed Study	77 hrs.
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	**Course total**		**150 hrs.**	

COURSE MATERIAL ARRANGEMENT	**Theory/Recitation**	
	Introduction to programming	3 hrs.
	Introduction to Python	2 hrs.
	Conditionals and loops	4 hrs.
	Data types and data structures	4 hrs.
	Scikit, NumPy and Pandas Libraries	3 hrs.
	Visualisation and graphs	2 hrs.
	Python and databases	2 hrs.
	Lab	
	Conditionals and loops	2 hrs.
	Data types and data structures	2 hrs.
	Scikit, NumPy and Pandas Libraries	2 hrs.
	Visualisation and graphs	2 hrs.
	Python and databases	2 hrs.

STUDENT PERFORMANCE EVALUATION	
Description of the evaluation procedure *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students*	Language of Evaluation: English Evaluation Procedure: ● Written Exams (70%). Methods of evaluation: ○ Open-ended questions ○ Problem solving ○ Multiple choice questions (on lab material) ● Group project (30%): ○ Training and evaluation of various ML models ○ The students should achieve a passing grade to participate in the written exams. The evaluation procedure is announced to the students during the first lecture and is also accessible at the e-learn platform throughout the entire semester.
STUDENT OBLIGATIONS *Compulsory attendance of lectures, labs, recitations, compulsory participation in midterms, exams, compulsory delivery of homework, projects, etc.*	● Compulsory attendance of lectures ● Compulsory attendance of labs ● Compulsory participation in the exams ● Compulsory delivery of project

(5) ATTACHED BIBLIOGRAPHY

1. Igual L., Segui S., Virtia J. et al (2017), Introduction to data science: a Python approach to concepts, techniques and applications, Springer.
2. McKinney W. (2012), Python for data analysis: data wrangling with Pandas, NumPy and iPython, O'Reilly.
3. Wickham, H., Grolemund G. (2017), R for data science: import, tidy, transform, visualize and model data, O'Reilly.