COURSE OUTLINE

(1) GENERAL

SCHOOLS	**ENGINEERING, NATURAL SCIENCES**		
ACADEMIC UNIT/UNITS	**COMPUTER ENGINEERING AND INFORMATICS DEPARTMENT, DEPARTMENT OF MATHEMATICS**		
TITLE OF MASTER'S DEGREE	*MSC in Data Driven Computing and Decision Making*		
LEVEL OF STUDIES	Post graduate		
COURSE CODE		SEMESTER	Spring
COURSE TITLE	DECENTRALIZED SYSTEMS FOR BIG DATA MANAGEMENT		

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
lectures	2	2/3
laboratory exercises	1	1/3
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*	*special background*
PREREQUISITE COURSES:	Data Structures, Databases, Object-Oriented Programming
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	https://eclass.upatras.gr/courses/CEID1175/

(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*

The course's aim is to introduce students to the Advanced Decentralized Computing Systems. Especially, it will focus on the following topics:

1. P2P Systems

2. DHT-based Decentralized Systems (Chord, Pastry, CAN)

3 Hierarchical-based Decentralized Systems (BATON, BATON*)

4. Probabilistic Decentralized Systems (Skip Lists, Skip Graphs)

5. Spatial P2P R-trees

6. Internet Caching Protocols and Bloom Filters

7. HDFS - GFS

8. Map – Reduce Programming Framework

9. NoSQL Databases

10. Apache Spark

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…*
	…….

After having successfully completed the course the student will be able to:

1. Understand the advanced concepts of Decentralized Computing Systems
2. Implement and manage the basic DHT-based Computing Systems
3. Understand the basic tools of design and analysis of Map-Reduce algorithms for solving problems, especially in NoSQL computing Systems
4. Understand the Apache Spark software tool for implementing large-scale machine learning and cloud-data engineering projects

(3) SYLLABUS

Week #1: Introduction to Advanced Distributed Systems

Week #2: P2P Systems

Week #3: DHT-based Decentralized Systems

Week #4: DHT-based Decentralized Systems (Cont.)

Week #5: Hierarchical-based Decentralized Systems

Week #6: Skip Graphs

Week #7: Internet Caching Protocols and Bloom Filters

Week #8: Spatial P2P R-trees

Week #9: GFS - HDFS

Week #10: HDFS (Cont.)

Week #11: Map – Reduce and NoSQL Databases

Week #12: Apache Spark

Week #13: Apache Spark (Cont.)

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	*Face-to-face*
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	*Use of ICT in teaching, laboratory education, communication with students*
TEACHING METHODS *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.* *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*	*Activity* / *Semester workload* *Lectures* 2/3 *laboratory practice* 1/3
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.*	Assignments (100%): - Presentation (50%) - Design and development (50%)

(4) ATTACHED BIBLIOGRAPHY

Advanced Distributed Computing: From Algorithms to Systems

Editors: **Krakowiak,** Sacha, **Shrivastava,** Santosh (Eds.)

https://www.springer.com/la/book/9783540671961