COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Sciences		
ACADEMIC UNIT	Department of Computer Science		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	717SKEC	**SEMESTER**	7
COURSE TITLE	DISTRIBUTED SYSTEMS AND BIG DATA		

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	5
Tutorial’ Exercises	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*	Specialised general knowledge, Skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

(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 successful completion of this module, students should be able to:

1. Understand the fundamentals of Distributed Systems: Interprocess communication, Naming, Remote Procedure Calls, Message Passing, Cloud Computing
2. Understand the representation of distributed algorithms
3. Augment on the correctness of distributed algorithms.
4. Handling time on a distributed system.
5. Mutual exclusion on a distributed system.
6. Collection of global state on a distributed system.

7. Graph algorithms and Synchronization algorithms.
8. Fault tolerant systems.
9. Distributed transactions.
10. Security
11. Sensor networks
12. Big Data Systems and Algorithms

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
- Working independently
- Project planning and management
- Production of new research ideas

(3) SYLLABUS

- Parallel and distributed computing
- High performance computing architectures
- Advanced topics in parallel computing
- Thread safe data structures
- Parallel programming patterns
- Scalable memory allocation

(4) 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*	Presentation with the help of slides and of the whiteboard, Website of the course with supporting and auxiliary material, Contact by e-mail.
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	52
Tutorial Exercises: Selected, representative exercises are solved concerning different modules of the course.	26
Literature study & analysis (group)	25
Individual or Group Project	20
Written Exams	2x1=2
Course total	***125 hours***

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.*	A. A written, final exam (60%) that includes: - Multiple choice questions - Solving exercises and problems related to the syllabus of the course B. Project presentation (40%)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
- Related academic journals:

[1] Rajkumar Buyya, Rodroigo N. Calheiros, "Big Data: Principles and Paradigms", Morgan Kafmann, 2016.
[2] Jules J Berman, "Principles and Practice of Big Data: Preparing, Sharing and Analyzing Complex Information", 2nd edition, Academic Press, 2018.
[3] Md. Rezaul Karim, Sridhar Alla, Scala and Spark for Big Data Analytics, Packt Publishing, 2017.
[4] Ian Foster, Dennis B. Gannon, William Grop, Ewing Lusk, Rich Wolski, Stig Telfer, "Cloud Computing for Science and Engineering (Scientific and Engineering Computation)", MIT Press, 1st edition, 2017.
[5] Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
[6] Kai Hwang, Min Chen, "Big-Data Analytics", Wiley, 2017.
[7] Bill Chambers, Matel Zaharia, "Spark: The Definite Guide: Big Data Processing Made Simple", O'Reilly, 2018.
[8] Sukumar Ghosh, "Κατανεμημένα Συστήματα", Κλειδάριθμος, 2023, μετάφραση της 2ης Αμερικάνικης Έκδοσης, Taylor & Francis Group, 2015 (in Greek).