(1) GENERAL

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>SCHOOL OF ENGINEERING</th>
</tr>
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<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>COMPUTER ENGINEERING AND INFORMATICS</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>CEID_NE4348</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>SPRING (8th)</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>Big Data Management Systems</td>
</tr>
</tbody>
</table>

INDEPENDENT TEACHING ACTIVITIES

<table>
<thead>
<tr>
<th>Lectures</th>
<th>2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Exercises</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Recitation sections</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).

COURSE TYPE

Specialized general knowledge, skills development

PREREQUISITE COURSES:

There are no prerequisite courses. It is however recommended that students have at least a basic knowledge of Database Systems, Data Structures, Algorithms and Programming.

LANGUAGE OF INSTRUCTION and EXAMINATIONS:

Greek. Instruction may be given in English if foreign students attend the course.

IS THE COURSE OFFERED TO ERASMUS STUDENTS: YES

COURSE WEBSITE (URL)

http://www.dblab.upatras.gr/gr/DBII.htm

(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

At the end of this course the student will:

1. Have acquired advanced knowledge in big data management systems and big data management concepts and understand the issues that are necessary for the efficient implementation of such systems.
2. Have understood the basic concepts of query processing and transaction processing as well as the basic concepts of concurrency control, and recovery from failures.
3. Have acquired experience with the usage of advanced indexing structures and tools for big data management systems and multimedia databases.
4. Be able to understand basic concepts of distributed and parallel database
systems, data mining, big data analytics and text databases.

5. Have acquired experience with the use of Hadoop ecosystem and NoSQL database systems.

6. Be able to apply the acquired knowledge on the topics listed above in designing real systems and new applications.

**Competences**

At the end of the course the student will have further developed the following skills/competences:

1. Ability to understand not only the basic principles of big data management systems, but also advanced concepts in very large databases and big data management and how these concepts are interrelated with the performance of working systems.

2. Ability to apply these concepts in order to design and implement efficient big data management systems and multimedia management systems.

3. Ability to work cooperatively in order to solve problems that arise during the development of a full-fledged working software system that supports different types of big data including also multimedia.

4. Studying abilities that are needed for continuous development of such systems that have increased demands.

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

**SYLLABUS**

- Spatial Access Methods).
- Indexing structures for big data and multimedia
- Query processing; Query optimization
• Object-oriented, object-relational DBMSs
• Transaction processing; Concurrency control; Deadlocks; Recovery
• Distributed and Parallel Database systems
• NoSQL databases, HBASE, Cassandra, MongoDB.
• NewSQL databases.
• Spark
• Hadoop.
• Mobile databases.
• Text Databases
• Web databases
• Big Data Processing and Analytics.
• Data Stream Management Systems
• Fractals in big data management systems
• Big data management systems technology and applications
• Future directions
TEACHING and LEARNING METHODS - EVALUATION

DELIVERY
Face-to-face, Distance learning, etc.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students
We use Information and Communications Technology in communication with students. We use e_class, e-mail, forum. The course has a web site.

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Semester workload</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>26</td>
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<tr>
<td>Laboratory Practise</td>
<td>13</td>
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<tr>
<td>Recitation</td>
<td>26</td>
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<tr>
<td>Project</td>
<td>30</td>
</tr>
<tr>
<td>Report writing</td>
<td>10</td>
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<tr>
<td>Study and analysis of bibliography</td>
<td>40</td>
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<tr>
<td>Course total</td>
<td>145</td>
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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.

(1) Written examination (70% of the final grade).
(2) Project (30% of the final grade)

(4) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

7. Michael Stonebraker, Readings in database systems, Morgan Kaufmann.
- Related academic journals:
  ACM Transactions on Database Systems
  IEEE Transactions on Big Data
  IEEE Transactions on Knowledge and Data Engineering
  VLDB Journal
  Information Systems
  SIGMOD Record