# Course Outline

## General

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>School of Engineering, University of Patras</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>Department of Computer Engineering and Informatics</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>Undergraduate Core Elective</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>CEID_NE5597</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>Winter</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>Information Retrieval</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Weekly Teaching Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures, Recitation sections, Project</td>
<td>2(L), 1(RS), 2(P)</td>
</tr>
</tbody>
</table>

### Course Type

- general background,
- special background,
- specialised general knowledge, skills development

- skill development

### Prerequisite Courses:

There are no prerequisites. Recommended prerequisite knowledge are the courses of data structures (CEID_NY233), algorithms (CEID_NY205) and database development (CEID_NY344).

### 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)

- https://mmlab.ceid.upatras.gr/el/lessons/undergraduate/123-information-retrieval
- https://eclass.upatras.gr/courses/CEID1037/

## 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 should be able to:

1. explain basic information storage and retrieval concepts and understand the issues that are specific to the design of efficient information retrieval systems.
2. explain the differences between alternative information retrieval models, and analyze why a particular model is appropriate for a specific application.
3. understand the basic design issues that are involved in the development of an efficient web search engine.
4. design and implement a small to medium size information storage and retrieval system.

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

1. ability to understand the various concepts of information retrieval systems, and how these are interrelated with the performance to a working system
2. ability to apply methodologically these concepts in order to design and implement efficient working systems
3. ability to work cooperatively in order to solve problems that arise during the construction of a full-fledged
working software system

**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
- Decision-making
- Adapting to new situations
- 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
- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Criticism and self-criticism
- Production of free, creative and inductive thinking
- Others...

**SYLLABUS**

1. Introductory notions (user modeling, document logical representation, retrieval process).
2. Performance evaluation metrics (recall, precision, average precision, R-precision, precision histograms, NDCG metric, harmonic median, user oriented metrics).
3. Information retrieval modeling.
4. Set-oriented models (boolean models, fuzzy set model, extended boolean model), algebraic models (vector space models, latent semantic indexing model, topic models), probabilistic models (classical and language models).
5. Web information retrieval and its peculiarities.
7. Indexing structures (inverted files, signature files, bitmaps).
8. Full indexing structures in main memory (suffix trees, suffix arrays, acyclic directed graphs (DAWG) for strings), and in secondary memory (supra-suffix array, prefix B-tree, string B-tree).
9. Compression algorithms for text and for indexing structures.
10. Text Mining

**TEACHING and LEARNING METHODS - EVALUATION**

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face-to-face, Distance learning, etc.</th>
<th>Face-to-face</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td>
<td>We use Information and Communications Technology in communication with students. We use e_class, e_mail, forum</td>
<td></td>
</tr>
<tr>
<td>TEACHING METHODS</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Semester workload</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>50 hours</td>
<td></td>
</tr>
<tr>
<td>Recitation sections</td>
<td>50 hours</td>
<td></td>
</tr>
<tr>
<td>Projects</td>
<td>50 hours</td>
<td></td>
</tr>
<tr>
<td>Course total</td>
<td>150 hours</td>
<td></td>
</tr>
</tbody>
</table>
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.

**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) composing and presenting an essay by groups of 1-2 students, concerning the critical presentation, implementation and analysis of algorithms in a set of scientific papers that deals with a specific topic of the course (50% of the final mark, taken into account only when the student secures the minimum mark of 5 in the final written examination),

(2) written examination (50% of the final mark).

**ATTACHED BIBLIOGRAPHY**

- Suggested bibliography:

- Related academic journals: