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

| Lectures and Tutorials, Laboratory Exercises | 3(LT), 2(LE) | 5 |
| Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d). |

WEEKLY TEACHING HOURS | CREDITS
--- | ---
Total | 5

COURSE TYPE

Skills development

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

PREREQUISITE COURSES:

None

LANGUAGE OF INSTRUCTION and EXAMINATIONS:

Greek

IS THE COURSE OFFERED TO ERASMUS STUDENTS

No

COURSE WEBSITE (URL)

https://eclass.upatras.gr/courses/CEID1126/

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

A. Lectures and Tutorials

Upon successful completion of the course, a student will be able to:

1. analyse and design a VLSI circuit,
2. design a complete, VLSI system,
3. aim to specific performance targets, of design,
4. optimize the design, upon a specified target,
5. evaluate the operation of the design, aimed to ASICs and FPGAs platforms,
6. be familiar with the evaluation, synthesis and simulation procedures.

B. Laboratory Exercises

Upon successful completion of the course, a student will be able to:

1. to design integrated VLSI circuits/systems,
2. to design based on the use of VHDL hardware description language,
3. evaluate the right operation and performance,
4. to take measurements, via real time scenarios of operation, for FPGAs design platform.

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
- 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
### Team work
- Working in an international environment
- Working in an interdisciplinary environment
- Production of new research ideas
- Production of free, creative and inductive thinking

### Working independently
- Team work
- Working in an international environment
- Working in an interdisciplinary environment
- Production of new research ideas
- Production of free, creative and inductive thinking

### SYLLABUS

- Introduction, basic terms
- VLSI digital circuits,
- Embedded systems,
- Actual circuits,
- Modeling,
- Design methodologies,
  - Design flow,
  - Design Optimization,
  - Design and test,
  - Testing,
- Hardware description languages: VHDL,
- Synthesis,
- Co-operation of circuits and VLSI components,
- Functions, arithmetic units,
- VLSI sequential circuits,
- Storage,
- Data paths, channels, data transmission,
- Synchronization,
- Control,
- Memory elements,
- Input/output devices,
- Detecting and correcting errors,
- Integrated circuits,
- Implementation technologies,
- ASICs,
- Programmable devices,
  - FPGA,
  - Packaging and circuit boards,
- Advanced topics,
- Modern and future applications,
- Special purpose, VLSI systems.

### TEACHING and LEARNING METHODS - EVALUATION

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face-to-face, Distance learning, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Face-to-face</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of ICT in teaching, laboratory education, communication with students</td>
</tr>
</tbody>
</table>

Wide use of ICT and more specifically:

- The course is backed up by a homepage, providing all course materials. This web page is duly updated.
- Course announcements are provided electronically and are available via: online news platform, and e-mail.
- The communication with the students is performed electronically: via e-mail. An online course forum, is also supported, for questions/answers, comments etc.

<table>
<thead>
<tr>
<th>TEACHING METHODS</th>
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</thead>
<tbody>
<tr>
<td>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>Semester workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>39 hours</td>
</tr>
<tr>
<td>Laboratory exercises</td>
<td>26 hours</td>
</tr>
<tr>
<td>Homework of laboratory exercises</td>
<td>32 hours</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.

<table>
<thead>
<tr>
<th>Study</th>
<th>46 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory exams</td>
<td>3 hours</td>
</tr>
<tr>
<td>Laboratory exams</td>
<td>1 hours</td>
</tr>
</tbody>
</table>

**Course total** 147 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.

The students’ assessment is supported in Greek, through a final written examination, twice in each academic year. The examination is based in two independent modules: theory and laboratory exercises.

The examination of the theory is organized by development questions, short answer questions, exercises and problems solving. Within ten days of the examination, scores and indicative answers to the exam questions are announced, and posted electronically. It is defined a day and an hour at which students can see their exams’ papers about any questions and doubts they may have, as well as to express their disagreement in rating, if they so wish. Then the rating is validated and finalized.

The evaluation of the laboratory exercises is done during students’ practice, in the laboratory room, but also in the laboratory reports they deliver after their completion.

**ATTACHED BIBLIOGRAPHY**

- Suggested bibliography:

- Related academic journals:
  - IEEE Transactions on Computers,
  - IEEE Transactions on Circuits and Systems,
  - IEEE Transactions on VLSI Systems.