



Course Syllabus

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| Course Code | Course Title | ECTS Credits |
| ECE-422 | Advanced Computer Architecture | 6 |
| Prerequisites | Department | Semester |
| ECE-111, ECE-421 | Engineering | Fall/Spring |
| Type of Course | Field | Language of Instruction |
| Elective | Computer Engineering | English |
| Level of Course | Lecturer(s) | Year of Study |
| 1 st Cycle | Dr Stelios Neophytou | 4 th |
| Mode of Delivery | Work Placement | Corequisites |
| Face-to-face | N/A | None |

Course Objectives:

The main objectives of the course and discuss advance topics of modern computers systems regarding their organization, microarchitecture and hardware implementation. Specifically, the course will focus on modern architectures implemented in multicores systems, embedded computers and computers for high performance and cloud applications.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Define computer architecture principles underlying in modern computer systems.
2. Discuss different architecture and hardware solutions embedded systems and systems used for cloud applications.
3. Explain advanced method used for performance optimization and cost reduction.
4. Discuss issues such as power consumption, technology depended design and system level testing.
5. Estimate and compare the performance of a server computers and explain how the performance is affected by their different characteristics.
6. Describe advanced systems infrastructure such as clusters and warehouse computing systems.
7. Describe modern multicore architectures and discuss their characteristics and performance.

Course Content:

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| <ul style="list-style-type: none"> • Data-Level Parallelism in Vector, SIMD, and GPU Architectures • Parallel Processors from Client and Cloud • Warehouse-scale computers • Special purpose Instruction set architectures • Request-level and Data-level Parallelism in Warehouse-scale computers • Embedded systems architecture • Large-scale multiprocessors and scientific computing • Advanced storage systems |
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Learning Activities and Teaching Methods:

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| Lectures, Lab and Homework Assignments, Literature Review, Course Project. |
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Assessment Methods:

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| Midterm Exam, Lab Assignments/Homework, Course Project, Final Examination(comprehensive) |
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Required Textbooks / Readings:

| Title | Author(s) | Publisher | Year | ISBN |
|------------------------------|--|-----------------|------|-------------------|
| Hennessy J. and Patterson D. | Computer Architecture: A Quantitative Approach | Morgan Kaufmann | 2012 | 978-0-12-383872-8 |

Recommended Textbooks / Readings:

| Title | Author(s) | Publisher | Year | ISBN |
|------------------------------|---|-----------------|------|-------------------|
| Patterson D. and Hennessy J. | Computer Organization and Design. The software/hardware interface | Morgan Kaufmann | 2014 | 978-0-12-407726-3 |
| David Tarnoff | Computer Organization and Design Fundamentals. | Lulu.com | 2007 | |