



<b>Course Code</b> ECE-522	<b>Course Title</b> Advanced Computer Architecture	<b>ECTS</b> 8
<b>Department</b> Engineering	<b>Semester</b> Fall, Spring	<b>Prerequisites</b> ECE-322
<b>Type of Course</b> Elective	<b>Field</b> Engineering	<b>Language of Instruction</b> English
<b>Level of Course</b> 2 <sup>nd</sup> Cycle	<b>Year of Study</b> 1 <sup>st</sup>	<b>Lecturer(s)</b> Dr Charalambos Christou
<b>Mode of Delivery</b> Face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

### **Objectives of the Course:**

The main objectives of the course are to:

Provide the student with the opportunity to study high-performance and supercomputer architectures used to solve very large-scale problems and computationally intensive applications, which are not realistically solvable on typical computers.

### **Learning Outcomes:**

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

- Assess parallel computers and scalability
- Compare multiprocessors interconnect (bus systems)
- Assess shared memory and message passing computer
- Compare vector and SIMD computers
- Explain massively parallel processing
- Explain granularity and dependencies
- Apply performance issues; Amdahl's and Gustaffson's laws
- Assess memory systems for parallel processors
- Discuss examples of supercomputers
- Explain software parallelism

### **Course Contents:**

- Parallel computers and scalability.
- Multiprocessor interconnects and bus systems
- Shared memory and message passing computers.
- Vector and SIMD computers.
- Massively parallel processing.
- Granularity and dependencies.
- Performance issues; Amdahl's and Gustaffson's laws.
- Memory Systems for parallel processors.

- Examples of supercomputers.
- Software parallelism

**Learning Activities and Teaching Methods:**

Lectures, In-class exercises, directed reading and homework, Learning through the project and project presentations

**Assessment Methods:**

Homework, Mid-Term, Final Exam, Design Project, Research literature review and presentation.

**Required Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
J. L. Hennessy, D. A. Patterson	Computer Architecture: A Quantitative Approach, Fifth Edition.	Morgan Kaufmann	2011	978- 0123838728

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Kai Hwang	Advanced Computer Architecture	McGraw-Hill	1993	
Kai Hwang, Zhiwei Xu	Scalable Parallel Computing: Technology, Architecture, Programming	McGraw-Hill	1998	