

## Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
INF 543	Advanced Embedded Systems	2	3	0	0	3	6

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Elective
Course Level	Masters Degree
Objective	<p>This course which builds on top of graduate-level knowledge of processor and systems architecture, aims to provide the current designs and trends in the field. Objectives of this course can be summarized as follows:</p> <ul style="list-style-type: none"><li>• Puts forward the differences between current trends and traditional designs approaches in the field of Computer architecture.</li><li>•Presents the design choices behind various commercial architectures.</li><li>• Puts forward the techniques used for designs at the level of computer architecture.</li><li>• Presents the effect of the computer architecture on the low level software.</li><li>• Enables the students to complete realistic designs on certain subcomponents of a modern computer architecture.</li><li>• Enables students with opportunities for assimilating the concepts and experimental methods presented in the class through multi-stage projects and assignments.</li></ul>

Content	<p>Week 1: Overall discussion of the course content, a brief summary of the subjects for the whole semester.</p> <p>Week 2: Processor architectures. Instruction set architecture (ISA) and microcomputer architecture. Define the components in the internals of a processor system.</p> <p>Week 3: Memory: Introduction of the semi-conductor technology related to the memory. Classification of the memory. Memory hierarchy. Error detection and correction techniques for memory</p> <p>Week 4: Cache memory. Taxonomy of Cache memory. Multi-level cache memory design.</p> <p>Week 5: RISC Architecture: General design principles behind RISC. Historical perspective. Introduction to Pipelining. Contrasting RISC with CISC architecture.</p> <p>Week 6: Pipeline Architecture - I</p> <p>Week 7: Pipeline Architecture - II</p> <p>Week 8: Midterm</p> <p>Week 9: Instruction Level Parallelism (ILP): Dependency types, ILP design approaches, challenges and solutions.</p> <p>Week 10: Instruction Level Parallelism (ILP): Performance Evaluation</p> <p>Week 11: Advanced Topics: Parallel Computers</p> <p>Hafta 12: Advanced Topics: ARM Architecture</p> <p>Hafta 13: Advanced Topics: GPU design and architecture</p> <p>Hafta 14: Advanced Topics: Performance evaluation of advanced microprocessor systems.</p>
References	<ul style="list-style-type: none"> <li>- Course notes</li> <li>- Hennesy, L., Patterson, D. "Computer Architecture A Quantitative Approach" 5/e, Morgan Kaufmann, 2011</li> </ul>

### Theory Topics

Week	Weekly Contents
1	Overall discussion of the course content, a brief summary of the subjects for the whole semester.
2	Processor architectures. Instruction set architecture (ISA) and microcomputer architecture. Define the components in the internals of a processor system.
3	Memory: Introduction of the semi-conductor technology related to the memory. Classification of the memory. Memory hierarchy. Error detection and correction techniques for memory
4	Cache memory. Taxonomy of Cache memory. Multi-level cache memory design.
5	RISC Architecture: General design principles behind RISC. Historical perspective. Introduction to Pipelining. Contrasting RISC with CISC architecture.
6	Pipeline Architecture - I
7	Pipeline Architecture - II
8	Midterm
9	Instruction Level Parallelism (ILP): Dependency types, ILP design approaches, challenges and solutions.
10	Instruction Level Parallelism (ILP): Performance Evaluation

<b>Week</b>	<b>Weekly Contents</b>
11	Advanced Topics: Parallel Computers
12	Advanced Topics: ARM Architecture
13	Advanced Topics: GPU design and architecture
14	Advanced Topics: Performance evaluation of advanced microprocessor systems.