



### University of Nicosia, Cyprus

<b>Course Code</b> ECE-410	<b>Course Title</b> Programmable Application Specific ICs	<b>ECTS Credits</b> 6
<b>Department</b> Engineering	<b>Semester</b> Fall or Spring	<b>Prerequisites</b> ECE-111, ECE-220
<b>Type of Course</b> Elective	<b>Field</b> Engineering	<b>Language of Instruction</b> English
<b>Level of Course</b> 1 <sup>st</sup> Cycle	<b>Year of Study</b> 4 <sup>th</sup>	<b>Lecturer</b> Dr Stelios Neophytou
<b>Mode of Delivery</b> Face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

#### Objectives of the Course:

Provide an introduction to the design process of digital systems using field programmable integrated structures, such as PLDs, CPLDs, and FPGAs, and to provide a thorough understanding of the different Application Specific Integrated Circuit (ASIC) architectures, design methodologies, and design tools.

#### Learning Outcomes:

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

- Analyze the design of FPGAs and ASICs that are suitable for tasks which cannot be executed efficiently by general-purpose microprocessors.
- Design digital circuits in a technology-independent means using a mix of levels (behavior and structure).
- Demonstrate the operation of standard CAD tools, especially for logic synthesis.
- Analyze and compare different circuit implementation, both in high level and in physical level.
- Carry out a complete project using FPGAs that involves architectural tradeoffs and simulation.

#### Course Contents:

- Introductory concepts of Applications Specific Integrated Circuits.
- Overview of CMOS logic and logic design using CMOS technology.
- Design process of an ASIC's Library.
- Overview of programmable ASIC architectures.
- Design and interconnection of programmable ASIC logic and I/O cells.
- Programmable ASICs families' overview and comparison.
- Programmable ASIC design, verification, synthesis, analysis and testing software.
- Low-Level Design Entry.
- Principles of hardware description languages.
- Design process and performance analysis using VHDL.

- Logic and Physical simulation of programmable ASICs.
- ASIC testing and principles of designing testable ICs.

**Learning Activities and Teaching Methods:**

Lectures, Lab Presentations and Tutorials, Lab and Homework Assignments.

**Assessment Methods:**

Homework, Lab Reports, Mid-Term, Project, Final Exam.

**Required Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Michael John Sebastian Smith	Application-Specific Integrated Circuits	Addison Wesley	1997	0-201-50022-1

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
W. Wolf	FPGA-Based System Design	Prentice- Hall	2004	
Z. Salcic, A. Smailagic	Digital Systems Design and Prototyping: Using Field Programmable Logic and Hardware Description Languages	Springer	2000	
A. Rushton	VHDL for Logic Synthesis, 2 <sup>nd</sup> Edition	John Wiley	1998	