

Liverpool John Moores University

Title: VLSI Design
Status: Definitive
Code: **7013ELE** (120433)
Version Start Date: 01-08-2014

Owning School/Faculty: Engineering
Teaching School/Faculty: Engineering

Team	Leader
Dave Harvey	Y

Academic Level: FHEQ7 **Credit Value:** 10.00 **Total Delivered Hours:** 38.00

Total Learning Hours: 100 **Private Study:** 62

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	18.000
Practical	12.000
Tutorial	6.000

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		70.0	2.00
Report	Coursework		30.0	

Aims

*To develop skills related to VLSI design.
To develop advanced skills in VLSI circuit design, at the transistor and gate levels.
To develop expertise in modern digital electronic circuit design and testing.*

Learning Outcomes

After completing the module the student should be able to:

- LO1 Design modern digital electronic circuits.
- LO2 Perform VLSI design with the aid of CAD software
- LO3 Realize MOS design methods and design rules
- LO4 Comprehend the principles of self testing within VLSI circuits

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	LO 1	LO 3	LO 4
Coursework	LO 1	LO 2	LO 3

Outline Syllabus

Review of clocked and pulse mode circuits, sequential circuit design. Asynchronous digital circuit design, fundamental mode circuit design. Design for test, Built-in Self Test (BIST/BIT), Boundary Scan testing, IEEE 1149.1 and variants.

Review of MOS technology, properties of MOS circuits, MOS Design rules, Stick diagram design, Transistor level design of MOS logic functions.

Semi-custom design, Selection of PLA/PLD/CPLD/FPGA/ROM based designs.

Languages for VLSI Design, levels of design and simulation, introduction to languages for VLSI design, eg VHDL, Verilog, Chipwise, Palasm, Abel.

Emerging technologies, future important devices, new design methods.

Learning Activities

Lectures supported by handouts & tutorials where appropriate.

Practical sessions will use software packages (eg Chipwise, Xilinx) for circuit design and development.

References

Course Material	Book
Author	Weste, N.H.E. and Harris, D.M.
Publishing Year	2011
Title	Integrated Circuit Design
Subtitle	
Edition	4th
Publisher	Addison Wesley
ISBN	9780321696946

Course Material	Book
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Author	Martin, K.
Publishing Year	2000
Title	Digital Integrated Circuit design
Subtitle	
Edition	
Publisher	Oxford University
ISBN	9780195125849

Course Material	Journal / Article
Author	IEEE, IEE
Publishing Year	
Title	IEEE Design and Test, IET Computers and Digital Technologies
Subtitle	
Edition	
Publisher	
ISBN	

Course Material	Book
Author	Fabricus, E.D.
Publishing Year	1990
Title	Introduction to VLSI Design
Subtitle	
Edition	
Publisher	McGraw-Hill
ISBN	9780070199484

Course Material	Book
Author	McCluskey, E
Publishing Year	1986
Title	Logic Design Principles, with Emphasis on Testable Semicustom Circuits
Subtitle	
Edition	
Publisher	Prentice Hall
ISBN	978013597848

Course Material	Book
Author	Pucknell, D.A. and Eshraghian, K
Publishing Year	1994
Title	Basic VLSI Design
Subtitle	
Edition	3rd
Publisher	Prentice Hall
ISBN	9780130791535

Notes

This level 7 module gives the student an advanced knowledge of the design and test techniques required for modern digital electronic integrated circuits, at the transistor, register and silicon level. Practical design is carried out with the help of modern ECAD software.

Integrated circuit design, or IC design, is a subset of electrical engineering and computer engineering, encompassing the particular logic and circuit design techniques required to design integrated circuits, or ICs. Physical design. VLSI circuit design flow with a focus on physical design. Here are the main steps of physical design. In practice there is not a straightforward progression - considerable iteration is required to ensure all objectives are met simultaneously. 1.2 Issues in Digital Integrated Circuit Design Integration density and performance of integrated circuits have gone through an astounding revolution in the last couple of decades. In the 1960s, Gordon Moore, then with Fairchild Corporation and later cofounder of Intel, predicted that the number of transistors that can be integrated on a single die would grow exponentially with time. Integrated circuit design, or IC design, is a subset of electronics engineering, encompassing the particular logic and circuit design techniques required to design integrated circuits, or ICs. ICs consist of miniaturized electronic components built into an electrical network on a monolithic semiconductor substrate by photolithography. IC design can be divided into the broad categories of digital and analog IC design. Digital IC design is to produce components such as microprocessors, FPGAs, memories Analog circuit design itself has evolved with the technology as well. This book deals with the analysis and design of analog CMOS integrated circuits, emphasizing fundamentals as well as new paradigms that students and practicing engineers need to master in today's industry. Since analog design requires both intuition and rigor, each concept is first introduced from an intuitive perspective and subsequently treated by careful analysis.