**Liverpool** John Moores University

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

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

| Team | emplid | Leader |
|---|---|---|
| Dave Harvey | | Y |

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| **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,Verliog, 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 |
|---|---|

| 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.