Module Proforma

Approved, 2022.02

Summary Information

Module Code	7404ELE
Formal Module Title	Digital IC Design
Owning School	Engineering
Career	Postgraduate Taught
Credits	20
Academic level	FHEQ Level 7
Grading Schema	50

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Weidong Zhang	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours

Lecture	11
Practical	22
Tutorial	11

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	The module aims to gain knowledge and understanding of a range of advanced IC digital design and analysis methods and to develop the design and test techniques required for modern digital microelectronic IC systems.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Appraise concepts, principles and theories of microelectronic circuit and system design to the appropriate level.
MLO2	Appraise appropriate hardware and software used in the field of digital IC system design.
MLO3	Develop advanced skills in microelectronic system design, at the gate, RTL and system level.
MLO4	Evaluate Microelectronic System Design, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies.

Module Content

Outline Syllabus
Review of combinational and sequential circuit design.Semi-custom digital system design, FPGA based digital system design.Digital system design, simulation and synthesis using Verliog HDL.Microelectronic system design at register and system levels.Considerations for high speed systems, metastability and clock distributionDesign of test bench and build-in test structure.Simulation, implementation and testing of medium scale systems.Design of digital IC systems utilizing embedded microprocessors and memories.Emerging technologies, future important devices, new design methods.

Module Overview

Additional Information

General NotesThis level 7 module gives the student an advanced knowledge of the design and test techniques required for modern digital IC systems. Extensive practical designs are carried out with the help of modern ECAD software and hardware development boards.   UNESCO Sustainable Development GoalsQuality EducationIndustry, Innovation and InfrastructurePartnerships for the GoalsUK SPEC AHEP 4CEng. M1 Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering.M2 Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed.M3 Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.M4 Select and critically evaluate technical literature and other sources of information to solve complex problems.M5 Design solutions for complex problems that evidence some originality and meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standardsM6 Apply an integrated or systems approach to the solution of complex problems.M7 Evaluate the environmental and societal impact of solutions to complex problems (to include the entire lifecycle of a product or process) and minimise adverse impacts.M8 Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.M9 Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.M10 Adopt a holistic and proportionate approach to the mitigation of security risks.M13 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.M14 Discuss the role of quality management systems and continuous improvement in the context of complex problems.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Report	100	0	MLO4, MLO1, MLO2, MLO3