ELEC840

VLSI, Algorithms, and Systems

S2 Day 2017

Dept of Engineering

Contents

General Information

Unit convenor and teaching staff
Unit Convener and Lecturer in Charge
Ediz Cetin
ediz.cetin@mq.edu.au
Monday's 13:00 – 14:00 hrs, Wednesday's 14:00 – 16:00 hrs.

Credit points
4

Prerequisites
Admission to MEng

Corequisites

Co-badged status

Unit description
This unit looks at VLSI technology from the perspective of an enabling platform for digital, analog, and complete system solutions. By taking a systems approach driven by the applications and algorithms, including analog interfacing or data communication links, the VLSI design is driven toward a more optimised solution by analysis at higher levels.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.
Incorporate designs trade-offs involving area, power and performance as a result of algorithm and architecture selection for practical problems requiring VLSI solutions.
Utilise circuit optimisation techniques in VLSI circuit design.
Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.

Execute a project to implement an application or algorithm into a VLSI technology and produce requirements, specifications, and designs for low-power, area and/or high performance.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 1	10%	No	Week 5
Assignment 2	10%	No	Week 8
Project	30%	No	Week 13
Exam	50%	No	Exam Date

Assignment 1

Due: **Week 5**
Weighting: **10%**

This assignment is concerned with fixed-point modelling of VLSI functions

On successful completion you will be able to:

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.

Assignment 2

Due: **Week 8**
Weighting: **10%**

This assignment is concerned with low-level implementation of fixed-point VLSI application

On successful completion you will be able to:

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.

- Incorporate designs trade-offs involving area, power and performance as a result of algorithm and architecture selection for practical problems requiring VLSI solutions.
- Utilise circuit optimisation techniques in VLSI circuit design.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.

Project

Due: **Week 13**
Weighting: **30%**

Design and implementation of a given VLSI application accompanied with a report.

On successful completion you will be able to:

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.
- Incorporate designs trade-offs involving area, power and performance as a result of algorithm and architecture selection for practical problems requiring VLSI solutions.
- Utilise circuit optimisation techniques in VLSI circuit design.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.
- Execute a project to implement an application or algorithm into a VLSI technology and produce requirements, specifications, and designs for low-power, area and/or high performance.

Exam

Due: **Exam Date**
Weighting: **50%**

3 hrs. closed book exam.

On successful completion you will be able to:

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.

Delivery and Resources

Textbook: None required to purchase. Lecturer will provide the reading material.

Suggested references: Keshab K. Parhi, “VLSI Digital Signal Processing Systems: Design and Implementation”, Wiley, 1998.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise

- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.
- Execute a project to implement an application or algorithm into a VLSI technology and produce requirements, specifications, and designs for low-power, area and/or high performance.

Assessment tasks

- Project
- Exam

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of

knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.
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Assessment tasks

- Assignment 1
- Assignment 2
- Project
- Exam

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.
- Incorporate designs trade-offs involving area, power and performance as a result of

algorithm and architecture selection for practical problems requiring VLSI solutions.
- Utilise circuit optimisation techniques in VLSI circuit design.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.
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Assessment tasks

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- Assignment 2
- Project
- Exam

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Evaluate systems and algorithms in regard to their implementation as a VLSI integrated circuits.
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Assessment tasks

- Assignment 1
- Assignment 2

- Project
- Exam

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Utilise circuit optimisation techniques in VLSI circuit design.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.
- Execute a project to implement an application or algorithm into a VLSI technology and produce requirements, specifications, and designs for low-power, area and/or high performance.

Assessment tasks

- Assignment 1
- Assignment 2
- Project
- Exam

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Demonstrate an understanding of foundational impact of implementation technology and develop advanced VLSI engineering skills.
- Demonstrate competency in the practical use of standard VLSI work products for communication and documentation of engineering processes.
- Execute a project to implement an application or algorithm into a VLSI technology and produce requirements, specifications, and designs for low-power, area and/or high

performance.

Assessment task

- Project