ELEC870

High Performance IC Design

S2 Day 2017

Dept of Engineering

Contents

General Information

Unit convenor and teaching staff
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Credit points
4

Prerequisites
Admission to MEng

Corequisites

Co-badged status

Unit description
From modern telecommunications to tablet computing and from mobile handsets to the cloud, the limits of integrated circuit technology are being pushed to the limits of what is possible in terms of speed, size, and power. Beyond the IC itself, packaging concerns, both electrical and thermal, provide additional constraints in the design of the modern high performance integrated circuit. This unit will be taught from the research of both resident and visiting staff as well as from the latest research around the world.

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:

1. Develop understanding of different semiconductor technologies
2. Ability to perform IC design in multiple semiconductor technologies
3. Develop proficiency in using standard EDA tools for IC design with multiple technologies
4. Develop proficiency in technology(device) simulator to understand technology tradeoffs
5. Demonstrate self-learning, time-management, technical report writing, and project management, individually and in a group setting

General Assessment Information

Late submission of project report will lose 10% marks per day after the deadline

In order to pass this unit a student must obtain a mark of 50 or more overall to obtain a passing grade P/ CR/ D/ HD.

Assessment Tasks

Name	Weighting	Hurdle	Due
Mid Term Exam	20%	No	TBA
Final Design Project	55%	No	Week 14
Final exam	25%	No	TBA

Mid Term Exam

Due: **TBA**
Weighting: **20%**

In-class 1 hour mid-term exam

On successful completion you will be able to:

- 1. Develop understanding of different semiconductor technologies

Final Design Project

Due: **Week 14**
Weighting: **55%**

Design project including: report and power point presentation of the achieved results.

Report should include theory of device technologies used for design, theoretical calculation of the design, simulation results and conclusions.

55% weight on project will be judged based on following aspects:

Report:

Theory of device technology and its understanding in report : 15%

Theoretical calculation on the design in report: 10%

Simulation results in report: 15%

Presentation:

Ability to explain design and technology trade-offs in presentation: 15%

On successful completion you will be able to:

- 1. Develop understanding of different semiconductor technologies
- 2. Ability to perform IC design in multiple semiconductor technologies
- 3. Develop proficiency in using standard EDA tools for IC design with multiple technologies
- 4. Develop proficiency in technology(device) simulator to understand technology tradeoffs
- 5. Demonstrate self-learning, time-management, technical report writing, and project management, individually and in a group setting

Final exam

Due: **TBA**
Weighting: **25%**

Written 2 hour final exam.

On successful completion you will be able to:

- 1. Develop understanding of different semiconductor technologies
- 2. Ability to perform IC design in multiple semiconductor technologies
- 4. Develop proficiency in technology(device) simulator to understand technology tradeoffs

Delivery and Resources

Course will have content from multiple sources including books and research papers.

Reference Books:

RF power amplifiers for Wireless Communications (S Cripps), Artech Publishers

Introduction to Device Modeling and Circuit Simulation (T. A. Fjeldly, T. Ytterdal, M. S. Shur), Wiley

Other material:

Series of engineering journal references

EDA tools which will be used :

Silvaco semiconductor technology(device) simulator

AWR circuit simulator

Semiconductor Technologies which will be covered: GaAs, GaN, Silicon LDMOS technology

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

- 1. Develop understanding of different semiconductor technologies
- 4. Develop proficiency in technology(device) simulator to understand technology tradeoffs
- 5. Demonstrate self-learning, time-management, technical report writing, and project management, individually and in a group setting

Assessment tasks

- Mid Term Exam
- Final Design Project
- Final 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

- 1. Develop understanding of different semiconductor technologies

- 2. Ability to perform IC design in multiple semiconductor technologies
- 3. Develop proficiency in using standard EDA tools for IC design with multiple technologies
- 4. Develop proficiency in technology(device) simulator to understand technology tradeoffs
- 5. Demonstrate self-learning, time-management, technical report writing, and project management, individually and in a group setting

Assessment tasks

- Mid Term Exam
- Final Design Project
- Final 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

- 1. Develop understanding of different semiconductor technologies
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Assessment tasks

- Mid Term Exam
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- Final 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

- 1. Develop understanding of different semiconductor technologies
- 2. Ability to perform IC design in multiple semiconductor technologies
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Assessment tasks

- Mid Term Exam
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- Final 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 outcome

- 5. Demonstrate self-learning, time-management, technical report writing, and project management, individually and in a group setting

Assessment task

- Final Design Project

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:

Assessment task

- Final Design Project