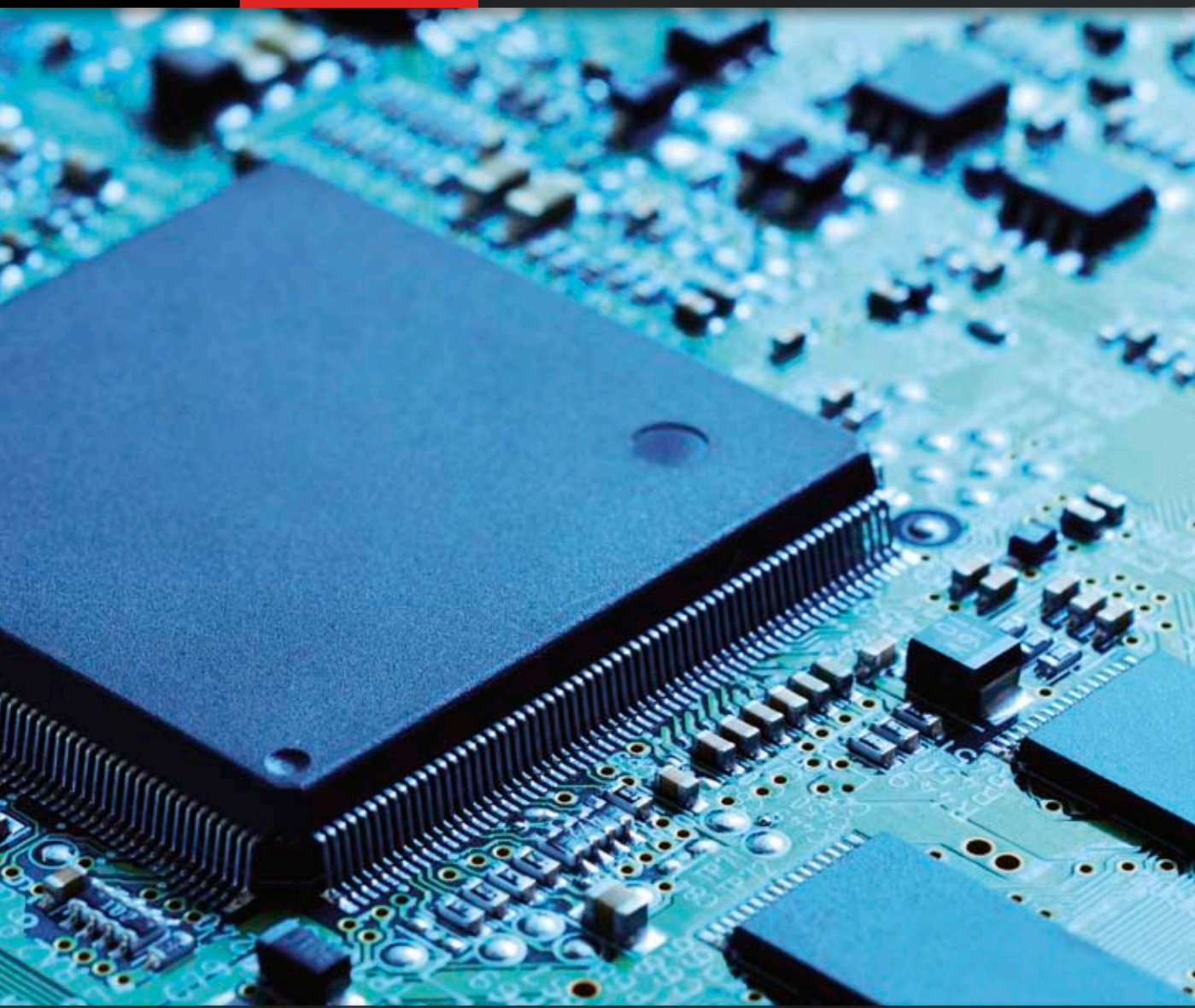
postgraduate

SWINBURNE UNIVERSITY OF TECHNOLOGY

Postgraduate programs in

Microelectronic Engineering



Faculty of Engineering and Industrial Sciences | www.swinburne.edu.au/postgrad

The major role of professional engineers in the Australian workforce is to act as agents for change through the development of technically sound, economically viable and socially acceptable solutions to complex and new technical problems. In this context, the microelectronics engineer today is faced with many challenges brought about by the rapid advances in computer, multimedia and telecommunication technology.

Swinburne's microelectronic programs address all aspects of this technology, from high level specification of microelectronic systems and implementation alternatives, to the realisation of integrated circuits. The programs aim to produce engineers with the necessary skills and practical experience to satisfy the requirements of the microelectronics industry. An important feature of these programs is the opportunity they provide for students to design their own integrated circuits.

Microelectronic Engineering

Graduate Certificate of Engineering (Microelectronic Engineering)

Graduate Diploma of Engineering (Microelectronic Engineering)

Master of Engineering (Microelectronic Engineering) (Honours)

Program overview

Swinburne's microelectronic engineering programs provide graduates with a high level of both logical and lateral thinking development so they are able to lead constructive change through innovation. They will use a multi-disciplinary engineering philosophy in the synthesis, design and integration of solutions. Students will also develop confidence and judgment so that the implementation of solutions proceeds successfully.

The programs aim to develop:

- integrated circuit design expertise in embedded system, digital, mixed signal and system-on-chip
- understanding of the device physics, fabrication process and testing needed by IC designers
- advanced technical skills necessary to master state-of-the-art microelectronic technology
- research skills necessary to obtain specialist knowledge of subjects pertinent to integrated circuit design
- logical and lateral thinking that leads to creation and innovation in the pursuit of solutions to engineering problems

Career opportunities

Graduates may find employment in areas of embedded system design, VLSI design, system on chip, chip design, design of DSP-based systems, and also in a wide range of industries including telecommunications, automotive, chip design and testing companies and research organisations.

Location

Hawthorn campus

Program length

Graduate certificate

One semester full-time or two semesters part-time

Graduate diploma

One year full-time or two years part-time

Master

One and a half years full-time or three years part-time

Master (Honours)

Two years full-time or four years part-time.

Admission requirements

Admission to the program normally requires a bachelor degree or equivalent from a recognised tertiary institution. This must be a four year degree in electronic engineering, computer engineering or communication/telecommunication engineering. Alternatively applicants must have a four year Bachelor of Science (Honours) degree in an appropriate field.

Applicants with a three year Bachelor of Science degree (in an appropriate field) or a Bachelor of Engineering degree in another field may also be considered for admission on the condition that they may be required to take up additional (preliminary) units that will strengthen their knowledge and skills in digital systems, analogue electronics and microprocessor systems.

Time commitment

In an academic semester a typical student weekly workload is deemed to be 50 hours per week. Total student contact hours, including lectures, classes, tutorials and laboratory and field sessions, will be approximately 16 hours per week.

Program structure

Each unit of study is valued at 12.5 credit points unless otherwise indicated.

Graduate Certificate of Engineering (Microelectronic Engineering)

In order to gain the Graduate Certificate of Engineering (Microelectronic Engineering) students must satisfactorily complete four units of study to the value of 50 credit points. Students must complete two core units, one elective from the Management group and one elective from the Microelectronic Design, VLSI Design or MEMS groups.

Graduate Diploma of Engineering (Microelectronic Engineering)

In order to gain the Graduate Diploma of Engineering (Microelectronic Engineering) students must satisfactorily complete eight units of study to the value of 100 credit points. Students must complete three core units, one elective from the Management group and four electives from the Microelectronic Design, VLSI Design or MEMS groups.

Alternatively students may replace two of the Microelectronic Design, VLSI Design or MEMS electives with a Minor Project (HET6020) valued at 25 credit points.

Master of Engineering (Microelectronic Engineering)

In order to gain the Master of Engineering (Microelectronic Engineering) students must satisfactorily complete units of study to the value of 150 credit points. Students may elect to complete 10 units and a minor project (Option A) or eight units and a major project (Option B).

Those students completing Option A must complete 10 units consisting of three core units, one elective from the Management group and six electives from the Microelectronic Design, VLSI Design or MEMS groups. In addition students must complete a minor project (HET6020) valued at 25 credit points.

Those students completing Option B must complete eight units consisting of three core units, Research Methods (HIT9010), one elective from the Management group, and three electives from the Microelectronic Design, VLSI Design or MEMS groups. In addition students must complete a major project (HET6030) valued at 50 credit points. Students must have completed Research Methods (HIT9010) prior to commencing the major project.

Master of Engineering (Microelectronic Engineering) (Honours)

The Master of Engineering (Microelectronic Engineering) (Honours) consists of 10 coursework units (125 credit points), a Minor Project (25 credit points) and a Major Research Project (50 credit points).

In order to qualify for the Master of Engineering (Microelectronic Engineering) (Honours), students must achieve a 70% average grade or higher in the final 100 credit points (e.g. the final two stages of a full-time two-year program) or an average grade of 75% or higher in the final 50 credit points (e.g. the fourth stage of a full-time two-year program). If this performance level is not achieved then the student will be awarded a standard Master of Engineering (Microelectronic Engineering) degree, even though the full 200 credit points of study may have been achieved.

Units of study

Core units

HET6001	HDL and High Level Synthesis
HET6002	Integrated Circuit Design
HET6004	Advanced Digital System Design

Management electives

HIR506	Technology Management
HES6791	Project Management
HES6175	Project Costing

Microelectronic design electives

HET6003	Hardware Implementation of Coding and Compression Algorithms
HET6005	Advanced Embedded System Design
HET6008	VLSI Digital Signal Processing Systems
HET6009	Reliability and Testability in IC Design
HET6014	RF and Mixed Signal Design

Research and project electives

HIT9010	Research Methods
HET6020	Minor Project (25 credit points)
HET6030	Major Project *(50 credit points)
HET6040	Major Research project

VLSI design electives

HET6007	Advanced VLSI Design
HET6009	Reliability and Testability in IC Design
HET6011	Introduction to Semiconductor Device Fabrication
HET6012	Semiconductor Device Physics

** Students who intend to undertake HET6030 Major Project are required to have successfully completed HIT9010 Research Methods in a previous semester.*

Unit of study outlines

HES6175 Project Costing

This unit raises awareness of the principles and practices of total cost management, and their application to establish and achieve time and cost budgets for engineered projects.

HES6791 Project Management

The aim of this unit is to introduce students to the fundamentals of management through their application to engineering projects.

HET6001 HDL and High Level Synthesis

This unit exposes students to the advanced HDL design techniques and methodology using industrial standard EDA tools in electronic design. The unit will also allow students to gain hands-on experience with the most recent digital design techniques.

HET6002 Integrated Circuit Design

Students in this unit will be exposed to integrated circuit design techniques and methodology using industrial standard EDA tools.

HET6003 Hardware Implementation of Coding and Compression Algorithms

Upon completion of this unit students should be able to implement on programmable hardware various compression and coding algorithms.

HET6004 Advanced Digital System Design

The aim of this unit is to expose students to the advanced design techniques, methodology and industrial standard EDA tools in Digital Circuits and Systems design.

HET6005 Advanced Embedded System Design

This unit aims to expose students to techniques and methodology in embedded system design. Students will develop hands-on experience in design, simulation, verification and implementation using industry standard EDA tools.

HET6007 Advanced VLSI Design

The aim of this unit is to expose students to advanced integrated circuit design techniques and methodology and design flow. The students will use modern integrated EDA software to accomplish schematic capture, simulation, layout, extraction, design verification and place and route.

HET6008 VLSI Digital Signal Processing Systems

Students in this unit will be exposed to the VLSI implementation of Digital Signal Processing Systems for VLSI and associated EDA tools.

HET6009 Reliability and Testability in IC Design

The aim of this unit is to develop an understanding of IC testing, design for improved testability and the reliability of electronic devices. Students will learn how to apply advanced verification techniques into the design flow, debug and test their design through the use of industry standard EDA tools.

HET6011 Introduction to Semiconductor Device Fabrication

Based on current methodologies, this unit introduces students to the basics of semiconductor device fabrication.

HET6012 Semiconductor Device Physics

The aim of this unit is to develop an understanding of the physical principles underlying the behaviour of semiconductors and to outline the methods by which semiconductor structures are characterised electrically, structurally and optically.

HET6014 RF and Mixed Signal Design

This unit aims to familiarise students with; modern radio electronic devices; circuits and systems; relevant background to the mobile communications standards; design concepts; methodology and design flow for low power mixed signal VLSI circuits.

HET6020 Minor Project/HET6030 Major Project

The minor and major projects enable students to be competent in advanced design techniques and methodology and industry standard EDA tools for complex integrated circuit and systems design. Projects should cover the design flow from requirement and specification to hardware/software implementation and test of the integrated circuit/system.

HIT9010 Research Methods

By the end of this unit students should be able to identify the basic principles and concepts of academic research. They will be able to: interpret and critically evaluate previously published research in a formal literature review; describe the characteristic features of common research methods and debate their relative merits; identify a research question (or project problem/objective) and justify the selection of an appropriate and ethically managed research method; produce a written research/project proposal/report/paper and effectively present information in an oral presentation.

Microelectronic Engineering

General information

Facilities

As a Swinburne student you will automatically gain access to a range of facilities. These include a well-resourced library, computer laboratories, fitness and health facilities, personal and career counselling, housing, employment and financial advice.

Fees for local students

In 2009, tuition fees for these programs are based on $1890 per 12.5 credit point unit of study. In the event that a unit of study is derived from another program, the applicable fee will be that of the other program. All fees are reviewed each year and may increase without notice.

FEE-HELP is a government-funded loan that helps eligible fee-paying students pay their tuition fees. FEE-HELP is not available to New Zealand citizens and most holders of Australian permanent visas, however is available to Australian citizens and holders of a permanent humanitarian visa. For further information visit **www.goingtouni.gov.au**

Application procedure

Application forms for postgraduate study can be downloaded at **www.swinburne.edu.au/postgrad**.

Closing dates

Semester one – Round one (timely) applications close early November. Round two (late) applications close mid January. Classes begin in late February/early March.

Semester two – Applications close late June, with classes beginning in late July/early August.

Round two (late) applications are subject to the availability of places. For closing dates visit:
www.swinburne.edu.au/postgrad

Recognition of Prior Learning

Recognition of Prior Learning (RPL) allows students to be granted credit or partial credit towards a qualification in recognition of skills and knowledge gained through work experience, life experience and/or formal training.

International students

If you want to study at Swinburne but are not an Australian resident, telephone Swinburne International on +61 3 8676 7002 (worldwide) or 1800 897 973 (within Australia) or visit **www.international.swinburne.edu.au**

Further information

Telephone: 1300 368 777
Email: postgrad@swinburne.edu.au
Website: **www.swinburne.edu.au/postgrad**

ANY QUESTIONS?

www.swinburne.edu.au
1300 ASK SWIN
postgrad@swin.edu.au

Postgraduate Information Day
The Atrium, John Street, Hawthorn campus.
Tuesday 7 October 2008, 4.00pm – 7.30pm

International students

International students can telephone
Swinburne International on +61 3 8676 7002 (worldwide)
or 1800 897 973 (within Australia)
Email international@swin.edu.au
Visit **www.international.swinburne.edu.au**

CRICOS provider code 00111D

This brochure was printed on recycled paper manufactured under the ISO 14001 environmental management systems standard.

Designed and produced by Swinburne Press Design Studio
SP0723-06-0808

2008 Swinburne Centenary