



# ELEC342

## Computer Hardware

S1 Day 2017

*Dept of Engineering*

### Contents

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<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	2
<a href="#"><u>Assessment Tasks</u></a>	3
<a href="#"><u>Delivery and Resources</u></a>	5
<a href="#"><u>Policies and Procedures</u></a>	5
<a href="#"><u>Graduate Capabilities</u></a>	7
<a href="#"><u>Changes from Previous Offering</u></a>	11

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## General Information

Unit convenor and teaching staff

Lecturer

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Friday 1-3pm

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Credit points

3

Prerequisites

(39cp at 100 level or above) including ELEC241

Corequisites

Co-badged status

Unit description

This unit is a sequence of lectures and practical work on digital circuits and systems, and their application throughout digital computers, from the central processing unit to remote peripherals. Students gain experience in using a range of techniques, including programmable logic devices for constructing various computer sub-systems and a PC-based development system for a small microcontroller (8-bit processor, digital and analogue I/O).

## 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:

- Understand the architecture of a computer
- Understand the functionality of major sections of a computer
- Ability to design sections of a computer
- Understand characteristics of microcontrollers

Ability to program microcontrollers in assembly language

Ability to interface microcontrollers to I/O devices

To be aware of advances in the technology of computer hardware

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Diagnostic Quiz</a>	0%	No	Week 3
<a href="#">Report 1</a>	15%	No	Week 9
<a href="#">Report 2</a>	15%	No	Week 13
<a href="#">Engagement</a>	20%	No	Continuous
<a href="#">Final Exam</a>	50%	Yes	Exam Timetable

### Diagnostic Quiz

Due: **Week 3**

Weighting: **0%**

A diagnostic quiz to show the current level of knowledge. This is compulsory, graded and feedback will be provided. The quiz is designed to provide feedback to the student about their readiness for this unit, and as such will not count towards the final unit mark.

On successful completion you will be able to:

- Understand the architecture of a computer

### Report 1

Due: **Week 9**

Weighting: **15%**

An individual report that covers the alarm project from weeks 6 to 8. This report will require an evaluation of your work and an explanation of key design decisions made during these laboratory sessions.

Grading will take into account the level of discovery as evidenced by insight presented in the report in terms of critical evaluation of the practical activity and technical justification of procedure and design.

On successful completion you will be able to:

- Understand the architecture of a computer
- Understand the functionality of major sections of a computer
- Understand characteristics of microcontrollers

## Report 2

Due: **Week 13**

Weighting: **15%**

A report, similar to report 1 based on your own project work. This report is to cover the design, implementation, debugging and evaluation of the music player in week 12.

On successful completion you will be able to:

- Ability to design sections of a computer
- Ability to interface microcontrollers to I/O devices

## Engagement

Due: **Continuous**

Weighting: **20%**

This component covers the pre-work for each laboratory session, as well as engagement during the laboratory sessions. This unit requires significant work, more than can easily be completed within the laboratory session only. Grading will take into account readiness to commence the laboratory session and the level of participation within the session as evidenced by attendance and demeanour. High marks will be awarded for initiative, approach to self learning and self-management.

On successful completion you will be able to:

- Ability to design sections of a computer
- Ability to program microcontrollers in assembly language
- Ability to interface microcontrollers to I/O devices
- To be aware of advances in the technology of computer hardware

## Final Exam

Due: **Exam Timetable**

Weighting: **50%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

The final exam will cover all the lectures and laboratory work. It will be a 3 hour closed book exam. You will be expected to be able to read and comprehend code snippets and produce

outlines of algorithms to perform certain tasks.

On successful completion you will be able to:

- Understand the architecture of a computer
- Understand the functionality of major sections of a computer
- Ability to design sections of a computer
- Understand characteristics of microcontrollers
- Ability to program microcontrollers in assembly language
- Ability to interface microcontrollers to I/O devices
- To be aware of advances in the technology of computer hardware

## Delivery and Resources

Lectures	There is one lecture per week. Currently it is scheduled for Tuesday 2-4pm. Attendance is compulsory at all lectures. Announcements will be made in lectures.
Assignments	there are two written assignments and one online quiz for this unit. These must be completed by the student and are individual in nature.
Laboratory Sessions	<p>There are 12 laboratory sessions, starting in week 2. Each student will attend one laboratory session per week. Some of the available time will be in group discussion, so prompt attendance is required. Each student will have individual work to perform that has to be completed before the end of the laboratory session.</p> <p>The engagement mark will be derived from the work completed before and during the laboratory session.</p> <p>Food and drink are not permitted in the laboratory. Students will not be permitted to enter the laboratory without appropriate footwear. <u>Thongs and sandals are not acceptable.</u></p>
Laboratory Note Book	Each student is required to have a bound laboratory notebook. This book must have all required pre-work recorded
Reports	There are two reports due during the unit. These are during week 9 and week 13.
Text Book	None
Notes	Notes for the course will be available on ilearn. Each student is required to preview the corresponding notes before each practical session.
Recommended Reading	These will be made available in the lectures. Each student will be expected to download the data sheet for the PIC microcontroller and the manual for MPLAB.

## 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](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](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](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](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/](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](http://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](http://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](http://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/](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

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcomes

- Understand the functionality of major sections of a computer
- Understand characteristics of microcontrollers
- Ability to program microcontrollers in assembly language
- Ability to interface microcontrollers to I/O devices

#### Assessment tasks

- Report 1
- Report 2
- Engagement
- Final Exam

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

#### Learning outcomes

- Ability to design sections of a computer
- To be aware of advances in the technology of computer hardware

## Assessment tasks

- Report 2
- Engagement
- Final Exam

## Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

## Learning outcomes

- Understand the architecture of a computer
- To be aware of advances in the technology of computer hardware

## Assessment tasks

- Diagnostic Quiz
- Report 1
- Engagement
- Final Exam

## Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

## Learning outcomes

- Understand the architecture of a computer
- Ability to design sections of a computer
- Understand characteristics of microcontrollers
- Ability to program microcontrollers in assembly language
- Ability to interface microcontrollers to I/O devices



## Assessment tasks

- Diagnostic Quiz
- Report 1
- Report 2
- Engagement
- Final Exam

## Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

### Learning outcomes

- Understand the architecture of a computer
- Understand the functionality of major sections of a computer
- Understand characteristics of microcontrollers
- Ability to interface microcontrollers to I/O devices

## Assessment tasks

- Diagnostic Quiz
- Report 1
- Report 2
- Engagement
- Final Exam

## Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

### Learning outcomes

- Understand the architecture of a computer
- Ability to program microcontrollers in assembly language

- Ability to interface microcontrollers to I/O devices

## Assessment tasks

- Diagnostic Quiz
- Report 1
- Report 2
- Engagement
- Final Exam

## Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## Learning outcomes

- Understand the functionality of major sections of a computer
- Ability to program microcontrollers in assembly language
- To be aware of advances in the technology of computer hardware

## Assessment tasks

- Report 1
- Engagement
- Final Exam

## Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

## Learning outcomes

- Ability to design sections of a computer
- To be aware of advances in the technology of computer hardware

## Assessment tasks

- Report 2
- Engagement
- Final Exam

## Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

## Learning outcomes

- Ability to design sections of a computer
- To be aware of advances in the technology of computer hardware

## Assessment tasks

- Report 2
- Engagement
- Final Exam

## Changes from Previous Offering

This offering will use a different teaching methodology, different microcontroller, different teaching board and different marking scheme.

We will have some lessons using a flipped teaching methodology. The students will prepare for the sessions by reading the descriptions of the work, and preparing for the work before the work is covered in the laboratory session and in the lecture session.

The microcontroller that will be used in the course has been updated to a PIC 16F690 microcontroller. It has a different instruction set, and takes advantage of advances in technology.