

## ELEC3730: Digital and Computer Electronics 2

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA

## OVERVIEW

**Course Description** In this course you will be introduced to the basic building blocks of an embedded system. You will design and develop software for commonly used peripheral devices as well as analyse and modify embedded software to make it fit for purpose.

**Academic Progress Requirements** Nil

**Assumed Knowledge** ELEC2720 Introduction to Embedded Computing

**Contact Hours**

**Callaghan Laboratory**  
Face to Face On Campus  
2 hour(s) per week(s) for 13 week(s) starting Week 1

**Lecture**  
Face to Face On Campus  
2 hour(s) per week(s) for 13 week(s) starting Week 1

**Lecture**  
Face to Face On Campus  
1 hour(s) per week(s) for 13 week(s) starting Week 1

**Unit Weighting** 10

**Workload** Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

# COURSE OUTLINE

# CONTACTS

<b>Course Coordinator</b>	<b>Callaghan</b> A/Pr Lawrence Ong Lawrence.Ong@newcastle.edu.au 0249215385 Consultation: By appointment
<b>Teaching Staff</b>	Other teaching staff will be advised on the course Canvas site.
<b>School Office</b>	<b>School of Engineering</b> EAG02 EA Building Callaghan +61 2 4921 5798 9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

# SYLLABUS

<b>Course Content</b>	<ol style="list-style-type: none"><li>1. ARM processor core</li><li>2. Embedded programming in C for the ARM processor core</li><li>3. Peripheral devices such as timers, UARTs, A/D converters and PWM timers in a RTOS environments</li><li>4. Cameras</li><li>5. Interfacing graphic displays and touchscreens</li><li>6. Filesystems</li><li>7. Real-time operating systems</li><li>8. Common communication interfaces, such as USB, wireless, ethernet</li></ol>
<b>Course Learning Outcomes</b>	<b>On successful completion of this course, students will be able to:</b> <ol style="list-style-type: none"><li>1. Identify the building blocks of an embedded system (hardware and software)</li><li>2. Perform a functional hardware design for an embedded system</li><li>3. Develop software for commonly used peripheral devices</li><li>4. Write application software using simple looping executives and real-time operating systems</li><li>5. Analyse and modify embedded software written by other professional developers</li></ol>
<b>Course Materials</b>	<b>Lecture Materials:</b> <ul style="list-style-type: none"><li>- Lecture materials will be posted on Canvas.</li></ul> <b>Other Resources:</b> <ul style="list-style-type: none"><li>- Other supporting material, including materials required to complete the assignments, will be posted on Canvas.</li></ul> <b>Recommended Text:</b> <ul style="list-style-type: none"><li>- Title: Mastering STM32 Author: Carmine Noviello Year: 2018 Publisher: LeanPub URL: <a href="https://leanpub.com/mastering-stm32">https://leanpub.com/mastering-stm32</a></li></ul>

# ASSESSMENTS

This course has 2 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignments x 3	Assignment 1 (10%): 11:55pm, Sunday 24/3/2024 Assignment 2 (15%): 11:55pm, Sunday 28/4/2024 Assignment 3 (40%): 11:55pm, Sunday 2/6/2024	Combination	65%	1, 2, 3, 4, 5
2	Formal Examination	During university examination period.	Individual	35%	1, 2, 3, 4

**Late Submissions** The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

## Assessment 1 - Assignments x 3

<b>Assessment Type</b>	Project
<b>Description</b>	Programming assignments using an embedded microprocessor based development system to solve specific problems using concepts and techniques learned in lectures. The assignments will progressively increase in complexity.
<b>Weighting</b>	65%
<b>Due Date</b>	Assignment 1 (10%): 11:55pm, Sunday 24/3/2024 Assignment 2 (15%): 11:55pm, Sunday 28/4/2024 Assignment 3 (40%): 11:55pm, Sunday 2/6/2024
<b>Submission Method</b>	Online Program source and design information to be submitted through the course Canvas site. Assessment will take place during normal laboratory sessions and include a demonstration of the working program.
<b>Assessment Criteria</b>	Understanding of working code. Implementation of hardware functions. Quality of code.
<b>Return Method</b>	Online
<b>Feedback Provided</b>	In Class - During assessment in the laboratory sessions
<b>Opportunity to Reattempt</b>	Students WILL NOT be given the opportunity to reattempt this assessment.

## Assessment 2 - Formal Examination

<b>Assessment Type</b>	Formal Examination
<b>Purpose</b>	To assess knowledge gained during the course.
<b>Description</b>	The formal exam will test all topics covered during the course. Questions will be drawn from lectures and assignments.
<b>Weighting</b>	35%
<b>Length</b>	2 hours
<b>Due Date</b>	During university examination period.
<b>Submission Method</b>	Formal Exam
<b>Assessment Criteria</b>	Details will be made available on the course Canvas site prior to the exam.
<b>Return Method</b>	Not Returned
<b>Feedback Provided</b>	No Feedback
<b>Opportunity to Reattempt</b>	Students WILL NOT be given the opportunity to reattempt this assessment.

# ADDITIONAL INFORMATION

## Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

\*Skills are those identified for the purposes of assessment task(s).

## Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

## Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

## Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

## Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

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**Adverse  
Circumstances**

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

**Important Policy  
Information**

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

*This course outline was approved by the Head of School on 30.01.2024. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*

### Graduate Profile Statements – ELEC3730 – S1 2024

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UO N Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	<b>Professional Attributes</b>				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.				
13	3.3. Creative, innovative and pro-active demeanour.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
14	3.4. Professional use and management of information.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.				
	<b>Engineering Ability</b>				
7	2.1. Application of established engineering methods to complex engineering problem solving.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
8	2.2. Fluent application of engineering techniques, tools and resources.				
9	2.3. Application of systematic engineering synthesis and design processes.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
	<b>Knowledge Base</b>				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.				
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.				
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				