School of Engineering

ELEC3400: Signal Processing

Callaghan
Semester 1 - 2024

COURSE OUTLINE

OVERVIEW

Course Description
Provides an introduction to the fundamentals of signal processing with an emphasis on filtering and spectral measurement. Both continuous and discrete time processing methods are covered.

Academic Progress Requirements
Nil

Assumed Knowledge
MATH1110 Mathematics for Engineering, Science and Technology 1, AND
MATH1120 Mathematics for Engineering, Science and Technology 2, AND
ELEC2430 Circuits and Signals

Contact Hours

Callaghan
Laboratory
Face to Face On Campus
2 hour(s) per week(s) for 5 week(s)

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

Tutorial
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.

CONTACTS

Course Coordinator

Callaghan
Dr Diego Carrasco Yanez
Diego.Carrascoyanez@newcastle.edu.au
(02) 4921 5091
Consultation: Thursday / 2.00 pm to 4.00 pm

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Engineering
EAG02
EA Building
Callaghan
Seng-Admin@newcastle.edu.au
+61 2 4921 5798
9.00am-5.00pm (Monday to Friday)

SYLLABUS

Course Content

1. Review of sampling theory and discrete-time systems
2. Review of continuous-time and discrete-time Fourier transforms and convolution
3. Discrete-time and Discrete Fourier Transform Theory
4. Fast Fourier Transforms
5. Z-transform
6. Analog filter design techniques and digital implementation
7. Extensions and applications

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Discuss the fundamental uses, distinction and trade-offs between analog and digital signal processing methods
2. Demonstrate expertise in analog and digital filter design methodologies
3. Design, implement and test digital filters
4. Apply different transform domain techniques for signal processing
5. Demonstrate skills and understand the principles of extensions and applications
6. Gain experience in working on a practical group project

Course Materials

Lecture Materials:

- Information provided in the course Canvas site
- Signal Processing & Linear Systems, by B.P. Lathi, Oxford University Press, 1998 (or the International Edition 2009/2010)

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Quiz	To be advised on Canvas site	Individual	10%	1, 2, 4
2	Laboratory Exercises	To be advised on Canvas site	Group	40%	1, 2, 3, 4, 5, 6
3	Formal Examination	Examination period	Individual	50%	1, 2, 3, 4, 5

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 - Quiz

Assessment Type Quiz
Description This is a 1.5 hour examination assessment student knowledge and understanding of the course material
Weighting 10%
Length 1.5 hours
Due Date To be advised on Canvas site
Submission Method In Class
Assessment Criteria Correct answers
Return Method In Class
Feedback Provided Returned Work
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Laboratory Exercises

Assessment Type Tutorial / Laboratory Exercises
Description The laboratory component of the course develops practical skills and knowledge in the area of signal processing
Weighting 40%
Due Date To be advised on Canvas site
Submission Method In Class
Assessment Criteria Correct answers
Return Method In Class
Feedback Provided In Class
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Formal Examination

Assessment Type Formal Examination
Description Examination held in the examination period
Weighting 50%
Length 2 hours
Due Date Examination period
Submission Method Formal Exam
Assessment Criteria Correct answers
Return Method Not Returned
Feedback Provided No Feedback
Opportunity to Reattempt 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.

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 14.02.2024. 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 – ELEC3400 – 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):

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