ELEC3044

Digital Signal Processing

Session 2, Special circumstance 2020

School of Engineering

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and ot her small group learning activities on campus for the second half-year, while keeping an online ver sion available for those students unable to return or those who choose to continue their studies onli ne.

To check the availability of face-to-face and onlin e activities for your unit, please go to timetable vi ewer. To check detailed information on unit asses sments visit your unit's iLearn space or consult yo ur unit convenor.

General Information

Unit convenor and teaching staff
Yiqing Lu
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7WW Room 360
Appointment via email

Rex Di Bona
rex.dibona@mq.edu.au

Credit points
10

Prerequisites
(ELEC2040 or ELEC240) or admission to MEngElecEng or MEngNetTeleEng

Corequisites

Co-badged status

Unit description
This unit explores the processing of discrete-time signals by discrete-time systems including signal and system representations in both the time (or space) domain and the frequency domain. Specific topics covered include generation and characterisation of discrete-time signals, time-domain analysis and processing methods, linear time-invariant discrete-time systems, discrete Fourier transform and Z-transform, frequency-domain analysis and processing methods, discrete-time filtering of signals, data compression, feature extraction and pattern recognition, adaptive signal processing and machine learning, as well as basics of hardware implementation.
This unit emphasizes practice-based learning approach, where students will perform the modelling, analysis, design, and simulation that cover practical aspects of digital signal processing.

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:

ULO1: Represent and manipulate discrete-time signals in the time domain and the

frequency domain.

ULO2: Determine the limitations and impact of sampling and sampling rate on the conversion between continuous and discrete time signals.

ULO3: Analyse the behaviour and determine the response of discrete-time linear systems.

ULO4: Analyse and design finite and infinite impulse response filters.

ULO5: Apply discrete-time signals and systems theory to practical problems.

ULO6: Use Matlab to represent and solve problems involving discrete-time signals and systems.

General Assessment Information

Grading and passing requirement for unit

In order to pass this unit a student must obtain a mark of 50 or more for the unit (i.e. obtain a passing grade P/ CR/ D/ HD). For further details about grading, please refer below in the policies and procedures section.

Late submissions

Late submissions of the DSP Project report will attract a penalty of 30% marks. Extenuating circumstances will be considered upon lodgment of an application for special consideration.

Late submissions of the Weekly Reports are not allowed.

Assessment Tasks

Name	Weighting	Hurdle	Due
Hurdle Quiz	5%	Yes	07/08/20
DSP Project	50%	No	08/11/20
Weekly Report	15%	No	The next Tuesday after every practical
Final Examination	30%	No	TBA

Hurdle Quiz

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **07/08/20**
Weighting: **5%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

There will be a hurdle quiz in week 2 worth 5%. The quiz contains 5 simple questions to test the

basic and prerequisite knowledge that will have been reviewed in the first week of the unit, and will take 30 minutes to complete.

On successful completion you will be able to:

- Represent and manipulate discrete-time signals in the time domain and the frequency domain.
- Determine the limitations and impact of sampling and sampling rate on the conversion between continuous and discrete time signals.
- Use Matlab to represent and solve problems involving discrete-time signals and systems.

DSP Project

Assessment Type [1]: Project
Indicative Time on Task [2]: 50 hours
Due: **08/11/20**
Weighting: **50%**

MATLAB codes accompanied by a 5000-word report on design, analysis and simulation of a project in Digital Signal Processing.

On successful completion you will be able to:

- Represent and manipulate discrete-time signals in the time domain and the frequency domain.
- Determine the limitations and impact of sampling and sampling rate on the conversion between continuous and discrete time signals.
- Analyse the behaviour and determine the response of discrete-time linear systems.
- Analyse and design finite and infinite impulse response filters.
- Apply discrete-time signals and systems theory to practical problems.
- Use Matlab to represent and solve problems involving discrete-time signals and systems.

Weekly Report

Assessment Type [1]: Lab report
Indicative Time on Task [2]: 13 hours
Due: **The next Tuesday after every practical**
Weighting: **15%**

Weekly report on practical activities.

On successful completion you will be able to:

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- Determine the limitations and impact of sampling and sampling rate on the conversion between continuous and discrete time signals.
- Analyse the behaviour and determine the response of discrete-time linear systems.
- Analyse and design finite and infinite impulse response filters.
- Apply discrete-time signals and systems theory to practical problems.
- Use Matlab to represent and solve problems involving discrete-time signals and systems.

Final Examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 23 hours
Due: **TBA**
Weighting: **30%**

2-hour final exam

On successful completion you will be able to:

- Represent and manipulate discrete-time signals in the time domain and the frequency domain.
- Determine the limitations and impact of sampling and sampling rate on the conversion between continuous and discrete time signals.
- Analyse the behaviour and determine the response of discrete-time linear systems.
- Analyse and design finite and infinite impulse response filters.
- Apply discrete-time signals and systems theory to practical problems.
- Use Matlab to represent and solve problems involving discrete-time signals and systems.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

We will be referring to the following textbooks as we progress through the unit:

- "Understanding Digital Signal Processing", Richard G. Lyons, 3rd edition (2010).
- "The Scientist and Engineer's Guide to Digital Signal Processing", Steven W. Smith, 2nd edition (1999).
- "Digital Signal Processing", John G. Proakis and Dimitris K. Manolakis, 4th edition (2007).
- "Discrete-time signal processing", Alan V. Oppenheim and Ronald W. Schafer, 3rd edition (2009).

MATLAB will be used for the practicals.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA

student contact globalmba.support@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 help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

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

If you are a Global MBA student contact globalmba.support@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.