ELEC3024

Control Systems

Session 1, Weekday attendance, North Ryde 2020

School of Engineering

Contents

General Information

Unit convenor and teaching staff
Senior Lecturer in Electrical Engineering
Mihai Ciobotaru
mihai.ciobotaru@mq.edu.au
Contact via 02 9850 2235
44WR-123
Wednesday 1:00 PM - 3:00 PM

Leonardo Callegaro
leonardo.callegaro@mq.edu.au

Credit points
10

Prerequisites
((ELEC2040 or ELEC240) or (MTRN2060 or ELEC260)) and (MATH2055 or MATH235) and (ELEC2070 or ELEC270)

Corequisites

Co-badged status

Unit description
This unit develops fundamental knowledge and skills in the area of control design and analysis of dynamic systems. Topics covered include: an introduction to control system design process and applications; mathematical modelling of electrical and mechanical systems in time and frequency domains; performance and stability analysis of single-input single-output linear control systems; design of feedback control systems using root locus and frequency response techniques; an introduction to digital control systems; and design of digital versus analogue control systems. This unit uses problem/team based learning approach, where students have to choose a project topic and their team members. Each team performs the modelling, analysis, control design, and simulation of the control system related to their project. Simulink/MATLAB and an Arduino control board are used to implement a real-time digital control system.

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: Describe a control system's design process and control systems analysis

ULO2: Develop appropriate mathematical models of electrical and mechanical systems to be controlled, both in time domain and frequency domain

ULO3: Analyse the performance and stability of single-input single-output linear control systems

ULO4: Design feedback control systems using tools such as MATLAB & Simulink to achieve specific performance requirements

ULO5: Characterise the behaviour of elementary feedback control systems using microcontroller based experiments

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult iLearn for revised unit information.

Find out more about the Coronavirus (COVID-19) and potential impacts on staff and students

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, or HD).
- For further details about grading, please refer below in the policies and procedures section.
- If you receive special consideration for the oral presentation and demonstration of the Project, a supplementary conventional exam will be scheduled by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the oral presentation and demonstration of the Project you are declaring yourself available for a conventional exam during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to applying. Approved applicants will receive an individual

notification one week prior to the exam with the exact date and time of their supplementary examination.

Hurdle Requirements

- Students must attend and participate in at least **6 of the 7 weekly PC Labs** (Weeks 1-7) to pass this unit.
- Students must attend and participate in at least **5 of the 6 weekly Project Labs** (Weeks 8-13) to pass this unit.

Late Submissions and Re-submissions

- Late report submissions will attract a penalty of <10/100, 10%> marks per day. Extenuating circumstances will be considered upon lodgement of an application for special consideration.
- Re-submissions of work are not allowed.

Students are reminded of the University policies regarding assessment, academic honesty and disruption to studies.

Requests for extension on assessable work are to be made to the Unit Coordinator but will only be considered in the event of illness or misadventure.

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

UNIT WEBSITE

- The iLearn website for this unit can be found at: https://ilearn.mq.edu.au/login/.
    - *Note! All information and communications relevant to this Unit will be via the iLearn website.*

TEXTBOOK

- Control Systems Engineering (Digital or Print), 8th Australia & New Zealand Edition 2019, Norman S. Nise, Wiley, ISBN: 9781119594352 (Digital version recommended).
    - *Note! Links will be provided to specific sections of the Digital version in iLearn for each Lectorial.*
- or, Control Systems Engineering (Print), 7th Edition 2014, Norman S. Nise, John Wiley &

Sons, ISBN: 9781118170519.

  - *Note! Only if you already have this textbook.*
- *Remark: All students are expected to have access to this textbook.*
- Support Website: http://www.wileydigitalsolutions.com.au/support/article/student/ – link to the Wiley's digital solutions support page and live chat for students.

LECTORIALS

- Lectorials take place twice a week (Weeks 1-7) according to the Unit schedule.
  - *Note! Students are strongly encouraged to attend at least one of the two weekly Lectorials.*
- Lectorials are a combination of traditional lecture and tutorial teaching modes and are designed to improve student engagement inside/outside classes.
- The Lectorials are organised in a flipped classroom fashion.
- Outside class
  - links to E-Text specific sections, brief videos and/or lecture notes are posted in iLearn each week.
  - students are expected to read these E-Text sections, try to solve any given examples, and watch any videos and/or read any posted notes prior to attending the Lectorials.
- Inside class
  - brief discussion sessions on fundamental principles.
  - plenty of practical examples.
  - interactive problem solving involving students.
  - quizzes/tests to assess the understanding of fundamental principles in control systems.

LABORATORIES

- PC Lab activities take place once a week (Weeks 1-7) according to the Unit schedule.
  - *Note! Students must enrol in one of the three available weekly Lab sessions.*
- Interactive PC Labs use MATLAB/Simulink software platform to assist with the modelling and design of control systems.

PROJECTS

- Project activities take place once a week (Weeks 8-13) according to the Unit schedule.
  - *Note! Teams must enrol in one of the three available weekly Project sessions.*
- The team Project is the core component of this Unit. The Projects cover practical aspects of control theory to be used in future Electrical, Electronics and Mechatronics units.

- Students are required to form teams and choose one project topic from a given list of projects.
    - *Note! When forming teams, students should agree in which weekly Project session they want to enrol.*
    - *All Project activities are performed in teams;*

TECHNOLOGY

- The laboratory work will rely on the use of MATLAB/Simulink software platform.
- The software is available through AppStream and/or on Faculty PCs.
- Each team will be given an Arduino kit for the second half of the semester to perform experimental activities.

COMMUNICATIONS

- Students are reminded the University will communicate all official notices by email to official MQ student's account. Students should read their @student.mq.edu.au email regularly or forward it to an account they check regularly.
- All announcements and other communications regarding this Unit will be via iLearn platform.

WEB RESOURCES

- **Control Tutorials for MATLAB and Simulink (CTMS):**
    - http://ctms.engin.umich.edu/CTMS/index.php?aux=Home
    - These tutorials are designed to help students learn how to use MATLAB/ Simulink for the analysis and design of automatic control systems.
    - They cover the basics of MATLAB/Simulink and introduce the most common classical and modern control design techniques.
- **MathWorks Website (MATLAB, Simulink, user-guides, tutorials, etc):**
    - MATLAB Courseware
        - https://au.mathworks.com/academia/courseware.html
    - MATLAB/Simulink Training for Macquarie University Students
        - https://trainingenrollment.mathworks.com/selfEnrollment?code=TSH4E9QU6C9G

Unit Schedule

Coronavirus (COVID-19) Update

The unit schedule/topics and any references to on-campus delivery below may no longer be

relevant due to COVID-19. Please consult iLearn for latest details, and check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

Refer to iLearn website for a detailed Unit schedule.

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://stu

dents.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.

Changes from Previous Offering

This Unit has been revised compared to previous offering as follows:

- All Lectorials and PC Labs take place in the first part of the semester (Weeks 1-7).
    - *Note! Assessment tasks for Lectorials and PC Labs will take place during this time interval.*
- All Project activities take place in the second part of the semester (Weeks 8-13).
    - *Note! Assessment tasks for Projects will take place during this time interval.*

Changes since First Published

Date	Description
18/02/2020	Removed specific times (e.g. Week 13, etc) from Assessment tasks in MQCMS (amendment approved), which has now been completed in iTeach in the Unit Guide. Note! All the specific days for assessment will be detailed in the Unit Schedule to be attached to the Unit Guide. I realised that I should not have added these Weeks in MQCMS, as it creates duplicates and confusion with the Unit Schedule.