School of
Engineering and Computer Science
Te Kura Mātai Pūkaha, Pūrorohiko

Prescription

The course shows how models can be used to analyse, describe and predict the behaviour of mechanical and electrical systems. The use of feedback to alter the properties of these systems to meet desired specifications is presented. A variety of methods are developed for designing control systems, including the use of a PID controller.

Course learning objectives

Students who pass this course should be able to:

1. Produce mathematical models of mechanical, electrical and electromechanical systems using differential equations. (Graduate Attributes 3a, c)
2. Predict the behaviour of a system given a differential equation or transfer function model for the system. (Graduate Attribute 3c.)
3. Understand the concept of feedback and how it influences the response of a system. (Graduate Attribute 3c)
4. Understand the operation and implementation of lead, lag and PID compensation and be able to design such compensators in continuous time using Root Locus and frequency response techniques. (Graduate Attribute 3b)
5. Predict and design operational amplifier circuit performance using the principles of negative feedback. (Graduate Attribute 3b)
6. Analyse a real-world system and then design, test and evaluate an appropriate control system to achieve specified objectives. (Graduate Attributes 3b, d, e, f)
7. Produce concise, correctly structured engineering reports, including statistical analysis, graphical presentation of results and discussion of methodological limitations. (Graduate Attribute 2b)

Course content

This course is partially a lab-based course. Some labs will require in-person attendance by students. There will be online options for students , but students will have to complete a relatively small set of physical lab requirements. There is some available flexibiity in the timing of those physical components, but please contact staff if you anticipate difficulty completing those requirements within the nominal course period.

Students taking this course remotely must have access to a computer with camera and microphone and a reliable high speed internet connection that will support real-time video plus audio connections and screen sharing. Students must be able to use Zoom; other communication applications may also be used. A mobile phone connection only is not considered sufficient. The computer must be adequate to support the practical work required by the course: almost any modern windows, macintosh, or unix laptop or desktop computer will be sufficient, but an Android or IOS tablet will not.

Withdrawal from Course

Withdrawal dates and process:

https://www.wgtn.ac.nz/students/study/course-additions-withdrawals

Lecturers

Dr Christopher Hollitt (Coordinator)

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AM 223 Alan Macdiarmid Building, Gate 7, Kelburn Parade, Kelburn

Daniel Burmester

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AM 404 Alan Macdiarmid Building, Gate 7, Kelburn Parade, Kelburn

Teaching Format

The course contact hours consist of two weekly face to face lectures and a weekly tutorial. The lectures cover control theory, while the tutorials cover problem solving, discuss applications of the material and allow preparation for the practical work. Tutorials also allow for discussion of the broader impact of control engineering, in areas such as system safety, energy efficiency and sustainability.

The course includes a single trimester long project, done partly in the labs, where students apply the material to the identification and control of a real-world system. Students produce two reports of approximately 10 pages outlining their work on the project. During this year the majority of the project will be able to be done remotely via simulation. However, there will be two lab sessions (nominally in week 7 and week 10) that will have a required hardware component that will require attendence in the laboratory.

Completion of the laboratory session presented in the first week will require physical attendence. While this laboratory is not directly assessed, it does contribute to the development of laboratory skills. Satisfactory completion of the report associated with this laboratory is therefore a mandatory course requirement.

There will be flexibility in the timing of the in-person laboratory activities. Students who believe they may have trouble completing them within the nominal course period should contact staff.

Student feedback

Student feedback will be provided via the submission system or other annotation on student work.

Dates (trimester, teaching & break dates)

- Teaching: 28 February 2022 - 03 June 2022
- Break: 11 April 2022 - 24 April 2022
- Study period: 06 June 2022 - 09 June 2022
- Exam period: 10 June 2022 - 25 June 2022

Class Times and Room Numbers

28 February 2022 - 10 April 2022

- **Tuesday** 09:00 - 09:50 – 204, New Kirk, Kelburn
- **Wednesday** 09:00 - 09:50 – 204, New Kirk, Kelburn
- **Friday** 09:00 - 09:50 – 204, New Kirk, Kelburn

25 April 2022 - 05 June 2022

- **Tuesday** 09:00 - 09:50 – 204, New Kirk, Kelburn
- **Wednesday** 09:00 - 09:50 – 204, New Kirk, Kelburn
- **Friday** 09:00 - 09:50 – 204, New Kirk, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Recommended

- The course text book is Norman Nise "*Control System Engineering*", now in its eighth edition. We will not follow the text closely, but students are advised to ensure access to the text or to an alternate source of practice problems. Physical copies of the text (and alternatives) are available in the library, and limited electronic access to the main text is also available. Details may be found on the course reading list.

Mandatory Course Requirements

In addition to achieving an overall pass mark of at least 50%, students must:

- Achieve a grade of at least 40% for each of the project reports, because the projects are the only assessment items addressing CLO's 6 and 7.
- Submit an adequate laboratory report for the instrumentation laboratory.

If you believe that exceptional circumstances may prevent you from meeting the mandatory course requirements, contact the Course Coordinator for advice as soon as possible.

Assessment

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
Assignments (4) (approx 6 hours each)	Weeks 4, 6, 10 and 12	CLO: 1,2,3,4,5	30%
Project Reports (2) (approx 10 hours each)	Weeks 6, 12	CLO: 1,2,3,4,5,6,7	20%
Tests (2) (2 hours each)	Week 7 and in the assessment period.	CLO: 1,2,3,4,5	50%

Penalties

Work submitted late will incur a 10% penalty per late day or part thereof. Students expecting to submit work late should use the extension system that is part of the submission system.

Extensions

Extension procedures for EEEN315 will use with the normal Faculty extension process. You need not contact the course lecturers directly for most assignment extensions, but simply follow the procedures

within the submission system. If you require extensions beyond that handled automatically then you should contact staff.

Submission & Return

Submission of assignments and project reports will be through the ECS submission system. Tests will be conducted via Blackboard.

Workload

The student workload for this course is 150 hours.

Teaching Plan

See: https://ecs.wgtn.ac.nz/Courses/EEEN315_2022T1/LectureSchedule

Communication of Additional Information

The ECS course wiki (https://ecs.wgtn.ac.nz/Courses/EEEN315_2022T1/) will be the main source of information for the course. Some information, notably video of the lectures and course feedback forms will be available on the Blackboard site.

Links to General Course Information

- Academic Integrity and Plagiarism: https://www.wgtn.ac.nz/students/study/exams/integrity-plagiarism
- Academic Progress: https://www.wgtn.ac.nz/students/study/progress/academic-progess (including restrictions and non-engagement)
- Dates and deadlines: https://www.wgtn.ac.nz/students/study/dates
- Grades: https://www.wgtn.ac.nz/students/study/progress/grades
- Special passes: Refer to the Assessment Handbook, at https://www.wgtn.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf
- Statutes and policies, e.g. Student Conduct Statute: https://www.wgtn.ac.nz/about/governance/strategy
- Student support: https://www.wgtn.ac.nz/students/support
- Students with disabilities: https://www.wgtn.ac.nz/st_services/disability/
- Student Charter: https://www.wgtn.ac.nz/learning-teaching/learning-partnerships/student-charter
- Terms and Conditions: https://www.wgtn.ac.nz/study/apply-enrol/terms-conditions/student-contract
- Turnitin: http://www.cad.vuw.ac.nz/wiki/index.php/Turnitin
- University structure: https://www.wgtn.ac.nz/about/governance/structure
- VUWSA: http://www.vuwsa.org.nz

Offering CRN: 34004

Points: 15
Prerequisites: EEEN 203 (or ECEN 203)
Restrictions: ECEN 315
Duration: 28 February 2022 - 26 June 2022
Starts: Trimester 1
Campus: Kelburn