

School of Engineering and Computer Science

Te Kura Mātai Pūkaha, Pūrorohiko



Prescription

This course presents advanced principles of robotic and mechatronic design, prototyping, construction and control. It covers both the theoretical and practical aspects of integrating the mechanical, electronic and software components and applies relevant machine learning concepts.

Course learning objectives

Students who pass this course should be able to:

1. Demonstrate an understanding of the integration of the inter-dependent electronic, mechanical and software components of a mechatronic design (BE Graduate Attribute 3(a), 3(b), 3(c), 3(d), 3(e), 3(f)).
2. Interact with a client to fully specify a complex robotic engineering design (BE Graduate Attribute 2(a), 2(b)).
3. Design functional bespoke components using 3D design software (BE Graduate Attribute 3(f)).
4. Use a variety of embedded tools, including relevant machine learning techniques, to control a complex robotic device (BE Graduate Attribute 3(b), 3(c), 3(d), e(e)).
5. Apply an understanding of the issues involved in high power switching to design power switching solutions for battery-powered mechatronic devices (BE Graduate Attribute 3(a), 3(c)).

Course content

This course is a practical course with the expectation of group work and use of laboratory facilities. Access to our laboratory facilities and tests will require in-person attendance by students in the Wellington Region. There will be online options for students outside the Wellington region, but students will have to complete alternative substitutes to the physical lab requirements. The remote option for tests will use a Zoom-based system for online supervision of the tests.

Students taking this course remotely from outside the Wellington region 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.

Required Academic Background

Students should have microcontroller programming experience and an understanding of second year university electronics.

Withdrawal from Course

Withdrawal dates and process:

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

Lecturers

Prof Dale Carnegie (Coordinator)

dale.carnegie@vuw.ac.nz 04 463 7485

AM 224 Alan Macdiamid Building, Gate 7, Kelburn Parade, Kelburn

Jim Murphy

jim.murphy@vuw.ac.nz 04 463 9562

FT92 202 92 Fairlie Terrace, Kelburn

Teaching Format

This course is a combination of theoretical material and the practical applications of that material. The main mode of delivery will be 24 face-to-face lectures. The material will be reinforced by practical assignments where groups and individuals will be expected to consult with the lecturer on an appointment basis (expect approximately 12 hours of such individualised tutorial engagement during the course).

Student feedback

Student feedback on University courses may be found at: www.cad.vuw.ac.nz/feedback/feedback_display.php

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

14 March 2022 - 10 April 2022

- **Thursday** 13:10 - 14:00 – 119, Cotton, Kelburn
- **Friday** 14:10 - 15:00 – 107, New Kirk, Kelburn

21 March 2022 - 10 April 2022

- **Tuesday** 13:10 - 14:00 – 204, New Kirk, Kelburn

25 April 2022 - 05 June 2022

- **Tuesday** 13:10 - 14:00 – 204, New Kirk, Kelburn
- **Thursday** 13:10 - 14:00 – 119, Cotton, Kelburn
- **Friday** 14:10 - 15:00 – 107, New Kirk, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Mandatory Course Requirements

There are no mandatory course requirements for this course.

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

This course will be assessed through one test, one exercise presentation and four assignments.

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
Mechatronic research, feature extraction and presentation (10 hours)	Week 3	CLO: 1	10%
Formative client focussed robotic design specification assignment (15 hours)	Week 5	CLO: 1,2,4	15%
Summative complex robotic design assignment (30 hours)	Week 7	CLO: 1,2,4	30%
Mechanical engineering assignment (10 hours)	Week 9	CLO: 1	10%
Test (1 hour)	Week 11	CLO: 1,5	15%
Solidworks practical assignment (20 hours)	Week 12	CLO: 1,3	20%

Penalties

A 5% penalty per day an assessment item is late will be applied.

Extensions

Requests for extensions should be made directly to the course lecturer responsible for that assessment item. The preferred mechanism is by direct email to either dale.carnegie@vuw.ac.nz or jim.murphy@vuw.ac.nz.

Submission & Return

It is preferred that assessment is either emailed as a pdf directly to the course lecturer responsible for that assessment item either dale.carnegie@vuw.ac.nz or jim.murphy@vuw.ac.nz. Alternatively, hard copies of the assessment may be handed directly to the course lecturer. Due to the small number of students in the course, we will NOT be using the automated submission system.

Normally assessment will be returned within 2 weeks of the hand-in date. However, should there be numerous requests for extensions, or some other mitigating factors, this may be delayed. Students will be informed of any such delays at the earliest opportunity.

Workload

The student workload for this course is 150 hours.

Teaching Plan

Communication of Additional Information

This course uses Blackboard. Course materials and other information will be posted on Blackboard. Students should check Blackboard regularly.

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-progress> (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: [34032](#)

Points: 15

Prerequisites: EEEN 325 (or ECEN 301)

Restrictions: ECEN 425

Duration: 28 February 2022 - 26 June 2022

Starts: Trimester 1

Campus: Kelburn