



Prescription

The course develops an understanding of the structure of computers, how they execute programs and how they interface to the real world. The course first covers ARM assembly language programming, data representation, computer arithmetic, microprocessor architecture at the hardware level and a comparison with GPU, DSP and FPGA architectures. The course then explores the design flow and application of embedded computers in real-world engineering problems. Practical experience is gained using microprocessors, techniques to interface them with the physical world, development tool chains, debugging and embedded Linux operating systems.

Course learning objectives

Students who pass this course should be able to:

1. Explain the main components of a typical computer and their interconnections, standard ways of representing data in hardware, the arithmetic and logic unit (ALU), data paths, pipelining, caches, and I/O. (BE graduate attribute 3(a))
2. Analyse the effects of the hardware logic designs in a computer on the basic operations in programming languages and the performance of computer programs. (BE graduate attribute 3(a))
3. Use an embedded computer to solve a variety of real-world problems, with and without the linux embedded operating system. (BE graduate attribute 3(b) 3(f))
4. Identify and explain the advantages and disadvantages of low-level programming versus using an embedded operating system. (BE graduate attribute 3(b) 3(f))
5. Effectively communicate in a written manner the methodology, design compromises, results and evaluation of embedded computer-based solutions to real-world problems. (BE graduate attribute 2(b) 3(f))

Course content

This course is a lab-based course. Labs 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.

Withdrawal from Course

Withdrawal dates and process:

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

Lecturers

Dr Robin Dykstra (Coordinator)

robin.dykstra@vuw.ac.nz 04 886 5334

AM 415 Alan Macdiarmid Building, Gate 7, Kelburn Parade, Kelburn

Dr Aaron Chen

aaron.chen@vuw.ac.nz 04 463 5114

AM 405 Alan Macdiarmid Building, Gate 7, Kelburn Parade, Kelburn

Teaching Format

During the trimester there will be two lectures per week plus one hour for tutorials. The lab component will consist of inlab sessions of three hours each.

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

28 February 2022 - 10 April 2022

- **Monday** 11:00 - 11:50 – 204, New Kirk, Kelburn
- **Wednesday** 11:00 - 11:50 – 204, New Kirk, Kelburn
- **Thursday** 11:00 - 11:50 – 204, New Kirk, Kelburn

25 April 2022 - 05 June 2022

- **Monday** 11:00 - 11:50 – 204, New Kirk, Kelburn
- **Wednesday** 11:00 - 11:50 – 204, New Kirk, Kelburn
- **Thursday** 11:00 - 11:50 – 204, New Kirk, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Recommended

- The course text book is "*Computer Organization and Design, ARM edition*". We will not follow the text closely or entirely, but students are advised to ensure access for additional reading.

Mandatory Course Requirements

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

- Achieve at least a **D** grade for 80% of the labs, because the practical work in the labs is critical to CLO 3, and is not assessed in the tests/assignments.

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 is internally assessed.

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
2 Tests (1 hour each)	TBC	CLO: 1,2,4,5	50%
2 Assignments (7 hours each)	TBC	CLO: 1,2,5	15%
Laboratory exercises / report (3 hour lab session plus 2 hours for analysis and write-up)	TBC	CLO: 2,3,4,5	35%

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 EEEN301 will use 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 laboratory reports will be through the ECS submission system. Marks and comments will also be returned via the submission system.

Workload

The student workload for this course is 150 hours.

Teaching Plan

See: https://ecs.wgtn.ac.nz/Courses/EEEN301_2022T1/LectureSchedule

Communication of Additional Information

The ECS course wiki (https://ecs.wgtn.ac.nz/Courses/EEEN301_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-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: [34002](#)

Points: 15

Prerequisites: EEEN 202 (or ECEN 202), NWEN 241

Restrictions: ECEN 301, NWEN 342

Duration: 28 February 2022 - 26 June 2022

Starts: Trimester 1

Campus: Kelburn