



Prescription

The course covers advanced topics in physical layer wireless communications. It begins with a brief introduction to Information Theory, leading to the concept of channel capacity. Multiple antenna techniques for both single and multiple user communications are discussed, including diversity, space time coding and digital beamforming. Large scale systems and advanced channel models are discussed. Matlab system simulations are used throughout the course for evaluating the communication system performance.

Course learning objectives

Students who pass this course should be able to:

1. Demonstrate the understanding of the basic concepts of information theory as applied to wireless communication systems (BE graduate attributes 3(a), 3(b) and 3(c)).
2. Characterise the capacity of additive white Gaussian noise and fading wireless channels (BE graduate attributes 3(a), 3(b) and 3(c)).
3. Demonstrate the understanding of the signal processing techniques used in multi-antenna communications for single and multiple users. (BE graduate attributes 3(a), 3(b) and 3(c)).
4. Evaluate the performance of wireless communication systems by means of computer simulations (BE graduate attributes 3(b) and 3(d) and 3(f)).

Course content

2022: The course is primarily offered in-person, and there are components such as tests, labs, tutorials, and marking sessions which require in-person attendance. There will be remote alternatives for all the components of the course, but these are only available to students studying from outside the Wellington region. The remote option for tests will use a Zoom-based system for online supervision of the tests.

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 programming 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 Pawel Dmochowski (Coordinator)

pawel.dmochowski@vuw.ac.nz 04 463 5948

AM 419 Alan Macdiamid Building, Gate 7, Kelburn Parade, Kelburn

Teaching Format

Taught during face-to-face lectures and tutorials. The assignments and projects will feature programming exercises using Matlab.

Student feedback

Towards the end of the course, student surveys on both the course lecturing and the course itself will be carried out. The results of previous course surveys can be found at http://www.cad.vuw.ac.nz/feedback/feedback_display.php

Dates (trimester, teaching & break dates)

- Teaching: 11 July 2022 - 14 October 2022
- Break: 22 August 2022 - 04 September 2022
- Study period: 17 October 2022 - 20 October 2022
- Exam period: 21 October 2022 - 12 November 2022

Class Times and Room Numbers

11 July 2022 - 21 August 2022

- **Monday** 12:00 - 12:50 – 107, Von Zedlitz, Kelburn
- **Thursday** 15:10 - 17:00 – LT119, Hunter, Kelburn

05 September 2022 - 16 October 2022

- **Monday** 12:00 - 12:50 – 107, Von Zedlitz, Kelburn
- **Thursday** 15:10 - 17:00 – LT119, Hunter, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Mandatory Course Requirements

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

- Achieve a mark of at least 40% on the test.

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 (2, approx. 6 hours each)	TBC	CLO: 1,2,3,4	10%
Test	Week 7	CLO: 1,2,3	40%
Projects (2, approx. 15 hours each)	TBC	CLO: 3,4	50%

Penalties

All work is due in on the due date at the due time. Marks will be deducted at a rate of 10% of the full mark for each working day late. Work will not be marked if more than one week late or if the model answers have already been handed back to the class.

Extensions

Extensions will be given only in exceptional circumstances, and if agreed **before** the due date.

Submission & Return

Assignments should be submitted by using the online submission system.

Assessment items will be returned during classes. If you miss the collection of an item please see the lecturer.

Bachelor of Engineering students should be aware that copies of their assessed work may be retained for inspection by an accreditation panel.

Workload

The student workload for this course is 150 hours.

Teaching Plan

See: https://ecs.wgtn.ac.nz/Courses/EEEN410_2022T2/LectureSchedule

Communication of Additional Information

All online material for this course can be accessed at https://ecs.wgtn.ac.nz/Courses/EEEN410_2022T2/

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: [34020](#)

Points: 15

Prerequisites: EEEN 310 (or ECEN 310)

Restrictions: ECEN 410

Duration: 11 July 2022 - 13 November 2022

Starts: Trimester 2

Campus: Kelburn