

School of Engineering and Computer Science

Te Kura Mātai Pūkaha, Pūrorohiko



Prescription

This course covers a range of topics in machine learning, with a focus on inference and uncertainty. Topics include optimization, Bayesian probability theory, learning from rewards, unsupervised learning, Belief networks and particle filters.

Course learning objectives

Students who pass this course will be able to:

1. show an understanding of the core issues in machine learning, especially related to pattern recognition;
2. express machine learning problems as inference problems using probabilities;
3. understand of a variety of machine learning algorithms, what their underlying assumptions are, and how they scale up;
4. approach new machine learning problems encountered after the course in insightful ways, and place them the context of current theory and practice.

Course content

This course looks at ideas and algorithms in contemporary machine learning. Broadly speaking machine learning is the study of how machines can learn from data and use that knowledge to help humans to make better decisions, or make those decisions themselves. Classic machine learning applications tend to be in robotic control, computer vision, speech recognition, spam filtering and anomaly detection, DNA sequence classification, and so on. The course teaches the essential ideas of machine learning with a particular focus on the state of the art techniques of deep learning and neural nets. Basic familiarity with using probabilities will be very useful for this course. It is primarily a lecture based course, and ranges over a variety of topics based around modelling data, carrying out inference, representing and using uncertain knowledge, learning models from data, and learning appropriate actions.

Withdrawal from Course

Withdrawal dates and process:

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

Lecturers

Marcus Frean (Coordinator)

Marcus.Frean@vuw.ac.nz 04 4635672

337 Cotton, Kelburn

Bastiaan Kleijn

bastiaan.kleijn@vuw.ac.nz 04 4636613

417 Alan MacDiarmid Building, Kelburn

Teaching Format

During the trimester there will be three lectures per week.

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: 08 July 2019 - 13 October 2019
- Break: 19 August 2019 - 01 September 2019
- Study period: 14 October 2019 - 17 October 2019
- Exam period: 18 October 2019 - 09 November 2019

Class Times and Room Numbers

08 July 2019 - 18 August 2019

- **Tuesday** 10:00 - 10:50 – 119, Cotton, Kelburn
- **Thursday** 10:00 - 10:50 – 119, Cotton, Kelburn
- **Friday** 10:00 - 10:50 – 119, Cotton, Kelburn

02 September 2019 - 13 October 2019

- **Tuesday** 10:00 - 10:50 – 119, Cotton, Kelburn
- **Thursday** 10:00 - 10:50 – 119, Cotton, Kelburn
- **Friday** 10:00 - 10:50 – 119, Cotton, 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:

- To pass COMP 421, a student must gain at least a **C-** grade overall. There are no mandatory requirements other than this.

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 lecture presenting, assignments, project + interview and final examination.

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
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Penalties

it is important to get the assignments in on time if possible, and so late hand-in will be penalized at 20% per day (unless a prior arrangement has been made with the lecturer).

Extensions

Individual extensions will only be granted in exceptional personal circumstances, and should be negotiated with the course coordinator before the deadline whenever possible. Documentation (eg, medical certificate) may be required.

Submission & Return

All work should be submitted through the ECS submission system, accessible through the course web pages. Marks and comments will be returned through the ECS marking system, also available through the course web pages.

Workload

In order to maintain satisfactory progress in COMP 421, you should plan to spend an average of 10-12 hours per week on this paper. A plausible and approximate breakdown for these hours would be:

- Lectures: 3
- Readings and reworking of the lecture material: 4
- Assignments: 4 (averaged - some weeks will be bigger than others)

Teaching Plan

Communication of Additional Information

All online material for this course can be accessed at https://ecs.victoria.ac.nz/Courses/COMP421_2019T2/

Links to General Course Information

- Academic Integrity and Plagiarism: <https://www.victoria.ac.nz/students/study/exams/integrity-plagiarism>
- Academic Progress: <https://www.victoria.ac.nz/students/study/progress/academic-progress> (including restrictions and non-engagement)
- Dates and deadlines: <https://www.victoria.ac.nz/students/study/dates>
- Grades: <https://www.victoria.ac.nz/students/study/progress/grades>
- Special passes: Refer to the Assessment Handbook, at <https://www.victoria.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf>

- Statutes and policies, e.g. Student Conduct Statute: <https://www.victoria.ac.nz/about/governance/strategy>
- Student support: <https://www.victoria.ac.nz/students/support>
- Students with disabilities: https://www.victoria.ac.nz/st_services/disability/
- Student Charter: <https://www.victoria.ac.nz/learning-teaching/learning-partnerships/student-charter>
- Terms and Conditions: <https://www.victoria.ac.nz/study/apply-enrol/terms-conditions/student-contract>
- Turnitin: <http://www.cad.vuw.ac.nz/wiki/index.php/Turnitin>
- University structure: <https://www.victoria.ac.nz/about/governance/structure>
- VUWSA: <http://www.vuwsa.org.nz>

Offering CRN: 986

Points: 15

Prerequisites: COMP 307, one further 300-level COMP, ECEN, NWEN or SWEN course

Duration: 08 July 2019 - 10 November 2019

Starts: Trimester 2

Campus: Kelburn