



## Prescription

This course teaches the ideas, algorithms and techniques of probabilistic machine learning. Topics include Bayesian inference, discriminative and generative classifiers, the EM algorithm, Gaussian processes, Markov Chain Monte Carlo, hidden Markov models, belief nets and other graphical models, and causal modelling.

## Course learning objectives

Students who pass this course will be able to:

1. Use probabilistic graphical models to carry out inference and learning
2. Apply generative models with latent variables in machine learning contexts
3. Apply a range of techniques for reasoning under uncertainty

## 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.

## Required Academic Background

This course involves frequent use of mathematics and mathematical notation, and so basic mathematics (especially linear algebra and probability) is essential. Advanced probability theory is not required.

## Withdrawal from Course

Withdrawal dates and process:

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

## Lecturers

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## Dr Marcus Frean (Coordinator)

marcus.frean@vuw.ac.nz 04 463 5672

CO 337 Cotton Building (All Blocks), Gate 7, Kelburn Parade, Kelburn

## Teaching Format

This course will be offered in-person and online. For students in Wellington, there will be a combination of in-person components and web/internet based resources. It will also be possible to take the course entirely online for those who cannot attend on campus, with all the components provided in-person also made available online.

## Student feedback

Student feedback on University courses may be found at:  
[www.cad.vuw.ac.nz/feedback/feedback\\_display.php](http://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** 14:10 - 15:00 – LT105, Alan MacDiarmid Building, Kelburn
- **Thursday** 14:10 - 15:00 – LT105, Alan MacDiarmid Building, Kelburn

### 25 April 2022 - 05 June 2022

- **Monday** 14:10 - 15:00 – LT105, Alan MacDiarmid Building, Kelburn
- **Thursday** 14:10 - 15:00 – LT105, Alan MacDiarmid Building, 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

Assessment Item	Due Date or Test Date	CLO(s)	Percentage
A series of small (typically <= 1 page) exercises, on recent mathematical material, and sometimes involving minor programming tasks or a small amount of writing (30 hours total)	weekly, on a day TBC.	CLO: 1,2,3	20%
Assignment (25 hours)	TBC in Week 6.	CLO: 1	15%
Assignment (25 hours)	TBC in Week 8.	CLO: 2	15%
Assignment (30 hours)	TBC in Week 11.	CLO: 3	20%
Final test (2 hours duration)	TBC during assessment period.	CLO: 1,2,3	30%

## Penalties

**Any assignment submitted after the deadline will have its maximum achievable mark reduced by 20% per day (ie. late assignments will still be marked out of 100% but the max mark capped at 80% for the first day, 60% for the second, etc). Individual extensions will only be granted in exceptional personal circumstances. We have a late days policy to cover minor problems.**

LATE DAYS POLICY: Each student will have three "late days" which you may choose to use for any assignment or assignments during the course. There will be no penalty applied for these late days. You do not need to apply for these, instead any late days you have left will be automatically applied to assignments that you submit late.

## 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. We also (automatically) allow for 3 late days in total over the trimester for this course without penalty.

## Submission & Return

All work should be submitted through the ECS submission system, which is 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

The student workload for this course is 150 hours.

## Teaching Plan

A detailed plan of lectures will be available (once the course starts) on

## Communication of Additional Information

All online material for this course can be accessed at [https://ecs.wgtn.ac.nz/Courses/AIML429\\_2022T1/](https://ecs.wgtn.ac.nz/Courses/AIML429_2022T1/)

## 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/](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:** [33071](#)

**Points:** 15

**Prerequisites:** AIML 420 or COMP 307; one of (MATH 177, STAT 292, 293) or approved background in Maths or Statistics;

**Restrictions:** COMP 421

**Duration:** 28 February 2022 - 26 June 2022

**Starts:** Trimester 1

**Campus:** Kelburn